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the diver's bible

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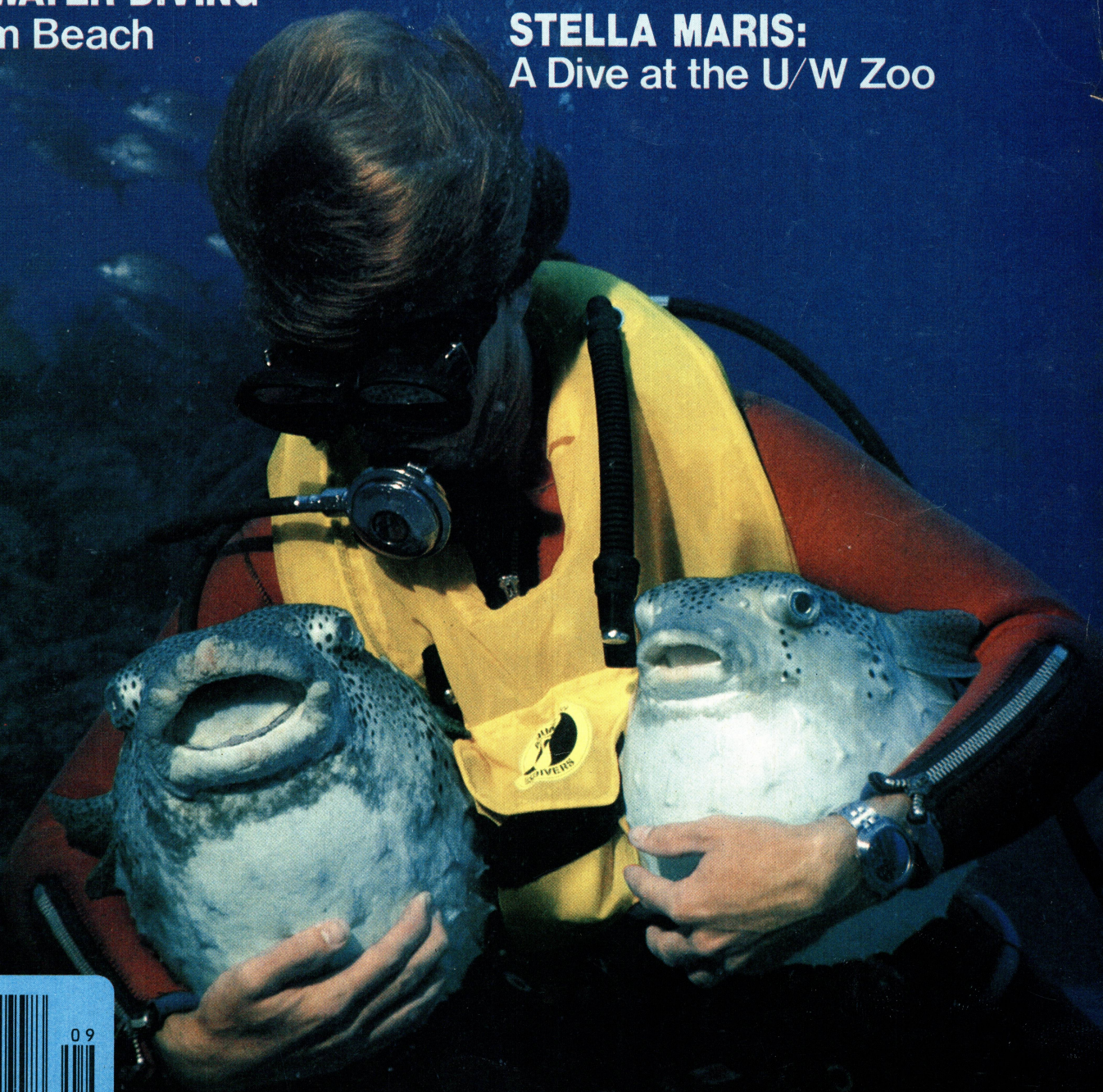
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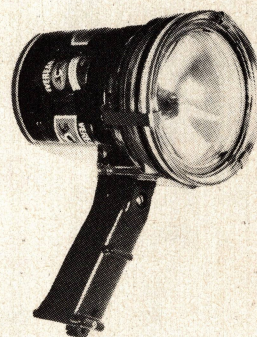
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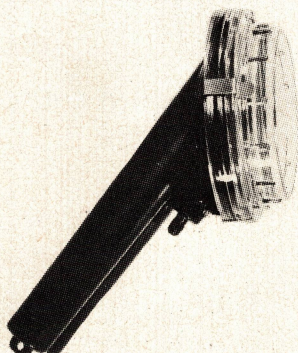
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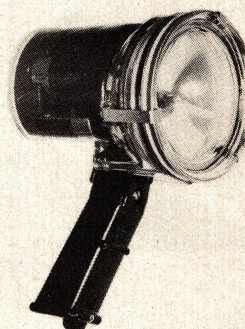
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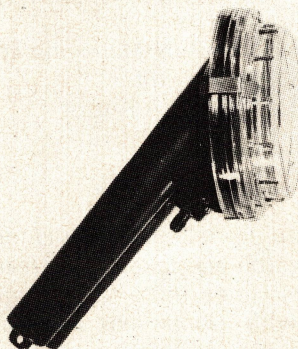
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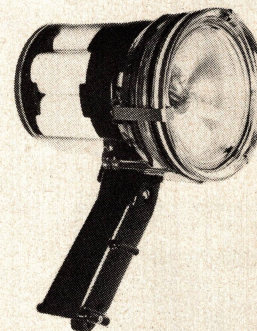


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VOLUME TWENTY-FIVE NUMBER NINE

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cover

John Larsen took this photograph of Bruce Williams from Colonnades Undersea Center, Florida, holding two porcupinefish. The photograph was taken in 60 feet of water on Breakers Reef off the beach from the Breakers Hotel, three to four miles south of the Palm Beach inlet. Larsen used Nikonos with 28mm lens and Subsea strobe.

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70/Underwater Zoo



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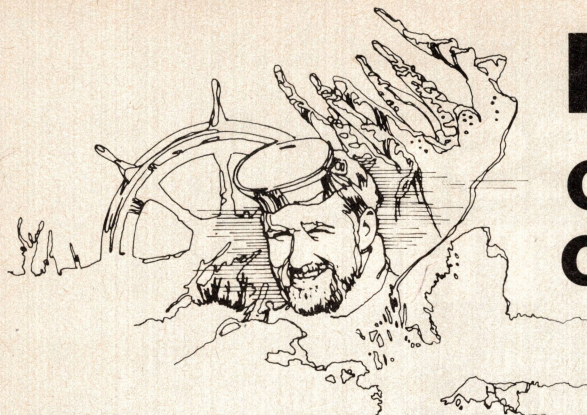
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Editorial

Controversy Over Buddy Breathing

by the Publisher

In December of 1975 SDM published an editorial which posed the question, "Is buddy breathing obsolete?" This article represented an open challenge to the continuance of buddy breathing training in the face of an alarming number of buddy breathing failures and subsequent double-death scuba accidents. Was buddy breathing killing more divers than it was saving, and why not replace this archaic rescue method with the much more simplified concept of octopus units? Unfortunately, the solution to such a serious problem is not as simple as it might first appear.

The SDM editorial on buddy breathing and similar articles in other dive publications have uncovered a deep rooted difference of opinion among this nation's scuba instructors. Survey polls conducted by various instructor associations indicate this country's instructors are split right down the middle (50/50) on the buddy breathing issue. Almost half are enthusiastically in favor of adopting the octopus concept, while the other half are staunchly defending buddy breathing as a safe and sound rescue method. Not only do instructor associations have differing philosophies, but individual instructors within the same association maintain different viewpoints.

Instructors who favor the continuance of buddy breathing claim that proper training and practice are the keys to successful air-sharing rescues. They are convinced that past accidents involving buddy breathing can be directly linked to poor training. However, stress studies conducted at UCLA indicate that it takes 17 to 20 training sessions during a basic scuba class before a student has sufficient skill to perform buddy breathing in a real emergency situation. Further studies show that the proficiency of buddy breathing skill deteriorates rapidly after class graduation unless the diver practices buddy breathing on a regular weekly basis.

Similar studies conducted by the YMCA have resulted in the same conclusions and the Y has recently revised its

entire standards for basic scuba certification. Students must now successfully complete the following exercises and skills before certification:

- 1) Buddy breathe 400 yards in 11 minutes without surfacing.
- 2) Buddy breathe 200 yards with no mask.
- 3) Buddy breathe 100 yards with no flippers.
- 4) Buddy breathe 50 yards with no mask or flippers.
- 5) Buddy breathe 200 yards while clearing a flooded mask.

Instructors who favor the octopus method claim that lifetime practice of air-sharing techniques is unrealistic. They contend that such self imposed requirements are contrary to basic human nature, and that people simply won't take the time to practice. This group is convinced that the octopus method is much safer and a far more simplified skill to learn. It requires less training time and little, if any, practice.

The rebuttal to this argument is that the octopus attachment is excessive in cost, requiring an additional \$50 to \$75 investment. The pro-buddy breathing group contends that new divers will not spend the extra money, and that many scuba students suspect the octopus concept is little more than a consumer rip-off for additional sales. As proof, they point to the fact that only 10% of scuba regulators in use today are equipped with octopus units. How can the scuba training associations afford to abandon buddy breathing when 90% of today's sport divers do not own octopus units?

The pro-octopus instructor group counters this argument with the age-old question of, "Which comes first, the chicken or the egg?" They claim that the lack of octopus unit ownership can be directly linked to a lack of training and commitment on the part of the scuba instructors who insist on teaching archaic methods. They feel that safety equipment is a good investment regardless of the price, and that the octopus concept would catch on quicker if the instructor

associations made this piece of gear mandatory for open water training and use by instructors in all training.

One PADI instructor devised a very simple training maneuver to overcome price objections. As part of his basic pool training sessions, this instructor has his students swim several laps underwater alternating between the buddy breathing technique and the use of the octopus. He not only teaches his students both methods, but also very cleverly points out the distinct advantages of the octopus. He claims that the choice of method is strictly up to the student, but by the end of the course everyone is in favor of the octopus.

There are, however, some problems involving octopus usage which must be resolved before the instructor associations can consider official adoption of this method. For one thing, no studies have been conducted on proper placement of the octopus unit nor on the correct and safest procedure for utilizing this device. There are no recognized standards or published procedures either for diver usage or training procedure — even though the octopus has been around for the last five or six years! No one really knows how much training should be required or if the octopus is actually safer than buddy breathing. These statistics simply do not exist.

Meanwhile, the debate continues among instructors with each group taking a strong and unrelenting stand. Not knowing which side to believe, but tending to follow the guidance of his class instructor, the student is confused by the pros and cons of the great debate. Worse yet, imagine what will happen when the graduate student of a pro-octopus instructor decides to go diving with a student of a pro-buddy breathing instructor?

The instructor associations must resolve this problem as quickly as possible. Perhaps the answer is to teach and use both methods. Whatever the outcome, this industry must have a universal set of safety standards which apply to all divers at all times. >>>

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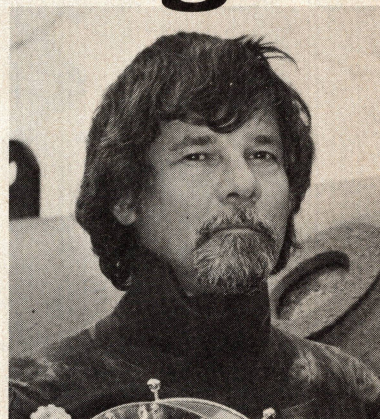
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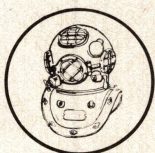
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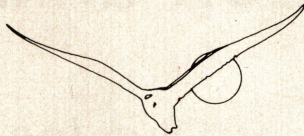
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Calendar



September 1

Entry deadline, NAUI North Atlantic Waters Photo Contest. (Contact: local northeast dive shop or Gene DeMarco, 34 Hancock Ave., Medford, MA 02155)

September 12-15

Oceans '76 Conference & Exposition, Sheraton Park Hotel, Washington, D.C. (Contact: Oceans '76, Technical Progr. Chmn. MTS-IEEE, Suite 412, 1730 M St., Washington, D.C. 20036)

September 13

Marine Technology Society Film Festival, Sheraton Park Hotel, Washington, D.C. (Contact: Barbara MacLeod, P.O. Box 1675, Galveston, TX 77550)

September 17-18

12th Annual San Diego Underwater Film Festival, San Diego Civic Theater. (Contact: Tom Southard Jr., 4130 Park Blvd., San Diego, CA 92103)

September 18

NAUI Underwater Film Review, John Hancock Hall, Berkeley St., Boston, MA., 8 p.m. (Contact: Fred Calhoun, P.O. Box 291, Back Bay Annex, Boston, MA 02117)

September 24-26

Dive Mark 76 2nd Annual Scuba Instructors Convention, Rockport, MA. (Contact: John R. Burrage, 74 E. Main St., Hopkinton, MA 01748)

September 25

Underwater Film Festival & Seminar, Washington, D.C. (Contact: Int'l Ocean II, Inward to the Sea, Box 41010, Washington, DC)

September 25

5th Inward to the Sea, Lisner Auditorium, George Washington University, Washington, D.C. (Contact: Inward to the Sea, P.O. Box 41010, Washington, DC 20014)

October 1-4

Man and the Sea 1976, Chevron Hotel, Sydney, Australia (Contact: Man and the Sea, P.O. Box 40, Spit Junction, N.S.W. 2088, Australia)

October 9

Seamark '76, New England Aquarium, 7:30 p.m. (Contact: Tony Salerno, 105 Beech St., Fitchburg, MA 01420 (617) 343-3526)



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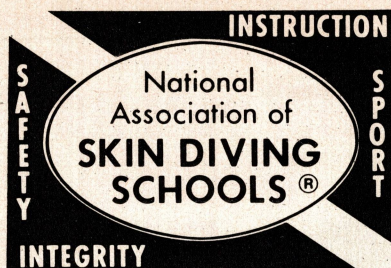
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Scuba I.Q.

Test Your Dive Knowledge

What's Your Search and Recovery IQ?

Nearly every diver has had to search for some item underwater at one time or another. Test your Search and Recovery knowledge by answering the following questions. Select the most correct answer to each question. Answers are on the following page.

- 1) **Search and recovery for items such as money, weapons or persons should:**
 - ☐ A. Be conducted by certified divers familiar with the area.
 - ☐ B. Be conducted by specially trained search & recovery teams.
 - ☐ C. Only be attempted when authorities request assistance.
- 2) **In search and recovery operations, the primary consideration is:**
 - ☐ A. Recovery of the object.
 - ☐ B. Organization and control.
 - ☐ C. The safety of the divers.
- 3) **When conducting search and recovery operations there should be one person in charge of:**
 - ☐ A. Every four divers.
 - ☐ B. Each team of divers.
 - ☐ C. The entire operation.
- 4) **Patterns used for searching underwater are:**
 - ☐ A. Variations of straight lines or circles.
 - ☐ B. Easily performed after a briefing.
 - ☐ C. Only needed if the search area is large.
- 5) **When using a line to a diver in search and recovery, the standard emergency signal is:**
 - ☐ A. Two pulls.
 - ☐ B. Four pulls.
 - ☐ C. Six pulls.
- 6) **When conducting a search in dark, swift water, the minimum number of people required for a safe operation is:**
 - ☐ A. Three.
 - ☐ B. Four.
 - ☐ C. Five.
- 7) **When the object sought has been located and must be lifted to the surface, the diver should first:**
 - ☐ A. Surface and notify the divemaster.
 - ☐ B. Mark the location of the object.
 - ☐ C. Rig the object properly for the lift.
- 8) **The most accurate patterns for underwater searching are:**
 - ☐ A. Tender directed.
 - ☐ B. Compass courses.
 - ☐ C. Gang sweeps.
- 9) **When searching in a river with a tended diver, remember:**
 - ☐ A. To use the river current to aid the search pattern.
 - ☐ B. Not to pull a submerged diver against the current.
 - ☐ C. Both of the above answers are correct.
- 10) **An immediate hazard exists when lifting an object underwater if:**
 - ☐ A. More than one lifting device is required.
 - ☐ B. The object is partially buried in sediment.
 - ☐ C. A partially inflated lifting device lifts it.
- 11) **Trained search and recovery divers employ special techniques to keep from stirring up silt primarily to:**
 - ☐ A. Preserve good visibility.
 - ☐ B. Keep silt from covering object.
 - ☐ C. Cause slow and deliberate searching.
- 12) **Lift bags used for recovery of objects underwater should be equipped with:**
 - ☐ A. A pressure relief valve.
 - ☐ B. A line attached to the highest point.
 - ☐ C. An independent inflation system.
- 13) **Three knots commonly used in rigging for recovery of objects underwater are:**
 - ☐ A. Bowline, two half hitches and sheet bend.
 - ☐ B. Clove hitch, square knot and figure eight.
 - ☐ C. Sheepshank, bowline and rolling hitch.
- 14) **Grid patterns are employed for underwater searching when:**
 - ☐ A. Object sought is small in size.
 - ☐ B. Bottom composition is very soft.
 - ☐ C. All other methods fail.
- 15) **Concerning the diver's safety line, always remember:**
 - ☐ A. Not to use floating line or tie the line to the diver.
 - ☐ B. To secure the free end topside and allow moderate slack.
 - ☐ C. Not to allow any slack and not to weight the line.

Scuba I.Q.

Test Your Dive Knowledge

What's Your Search and Recovery I.Q.?

Answers from questions on page 9.

- 1) B. Be conducted by specially trained search & recovery teams. Searching for relatively unimportant items may be undertaken by divers, but searches of a serious nature should be left to teams of divers specially trained for such activities. Search and recovery for important items is highly sophisticated and frequently hazardous.
- 2) C. The safety of the divers. No object sought is more important than the safety of those searching. Do not jeopardize divers in order to locate or retrieve any object.
- 3) C. The entire operation. A single divemaster must have control of the total activity. This person directs all operations and may stop the search at any time. Only the divemaster communicates with other groups or the news media.
- 4) A. Variations of straight lines or circles. Search patterns should always be used and are not easily performed. All patterns, however, rely on a circle, arc or straight line for coverage. Keep search patterns as simple as possible.
- 5) B. Four is the standard number for an emergency signal. Four blasts on a whistle or four pulls on a line should alert the receiver that there is an emergency situation.
- 6) A. A diver, a tender and a standby diver are the minimum required number of people to search safely in dark, swift water. A tended diver on a safety line is safer than a diver with a buddy in these conditions.
- 7) B. Mark the location of the object. It is not uncommon for divers to lose an object after finding it and then have to search for it again, so be sure to mark the object with a buoy before doing anything else.
- 8) A. Tender directed. A tender controlling the length and direction of a line and watching the diver's bubbles can conduct a very accurate search by coordinating with the diver.
- 9) C. Both of the above answers are correct. Do not swim against a current, but use the current to aid the search instead. Line should be let out a small amount at a time to a diver working slowly downstream while facing upstream. Do not pull a submerged diver against the current since entanglement and injury are possible. Have divers surface prior to pulling them against the current.
- 10) C. A partially inflated lifting device lifts it. A partially inflated lifting device will have the air inside it expand during ascent causing acceleration and a potential hazard. The object may get out of control, rocket to the surface, lose buoyancy and sink rapidly back down on the submerged divers.
- 11) B. Keep silt from covering the object. Search & recovery operations frequently take place in dark or dirty water where visibility is poor or nonexistent, so the silting would not seriously affect visibility. Settling silt can obscure an object and prevent recovery.
- 12) B. A line attached to the highest point. This line, called a dump line allows divers to control a lift by tipping the bag to vent excess air. Having control of the lift makes recovery operations much safer.
- 13) A. Bowline, two half hitches and sheet bend. The bowline is an excellent underwater knot with many uses as is two half hitches. A sheet bend is useful for tying two lines together. A square knot slips underwater and a sheepshank has little application.
- 14) A. Object sought is small in size. When a meticulous, careful search needs to be conducted for objects such as watches or rings, a grid of ropes or pipes is usually placed over the area to assure thorough coverage.
- 15) C. Not to allow any slack and not to weight the line. Slack can lead to entanglement of the diver's safety line and prevents communication via the line to the diver. A weighted safety line can also cause entanglement and inhibit communication.

Are you proficient at search & recovery? Were you aware of all the knowledge and procedures tested? Search & recovery is really a sport within the sport of diving and is extremely complex. Regardless of your score, we hope you will obtain specialty training in search & recovery if you intend to be involved in the activity on a regular basis. It is challenging, but there are numerous hazards and techniques requiring knowledge, training, practice and organization. Next month's exam is on Wreck Diving.

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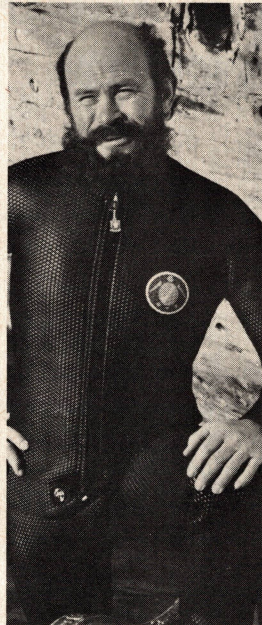
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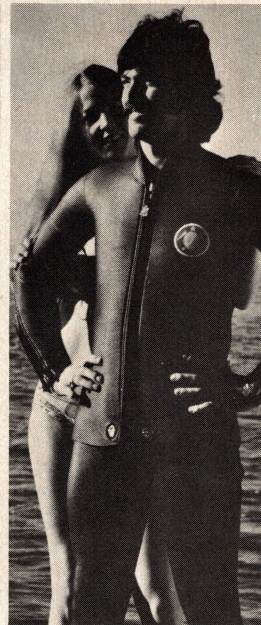
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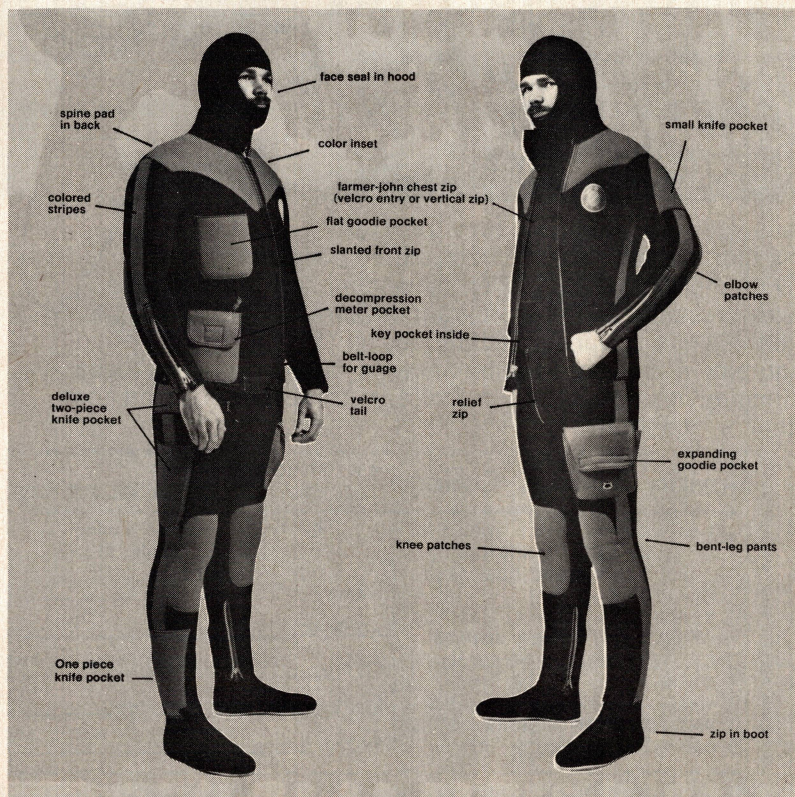
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Underwater Forum

... The answer to question #11 in May SDM's Scuba I.Q. recommended use of a colored or flashing light or lights to mark the night divers' exit point. As was pointed out, this definitely aids the divers in distinguishing such a beacon from other lights on the beach. However, it should be recognized that one light can only serve to identify a single point; whereas, many exits are best approached via narrow channels defined by invisible reefs, sandbars, or rocks.

A reliable compass reading is quite difficult at night, and I have found it extremely useful during night dives from

the beach to mark the center of these restrictive passages with two distinctive lights. The lights should be positioned on the beach, one at least 10 feet behind and two feet above the other on a landward extension of the correct course. The height could vary since the Maritime Dictionary states, "the difference in height between the two lights should be about six feet for every mile at which they must show." Among sailors, this type of navigational aid is called a range.

A ship or diver offshore needs merely maneuver to a position where the two lights are vertically in position one above

the other and then home in to safety.

This arrangement keeps hundred of vessels from becoming derelicts every day. It can also prevent injury, torn wet suits and lost gear when night diving.

One final word of caution: make certain that none of your lighting arrangements duplicate established maritime navigational aids in the nearby vicinity. Collision with a large ship could spoil your entire evening.

CDR. JOHN THURBER

SAN FRANCISCO, CALIF.

... The use of range lights to mark the exit point for night diving is an excellent method to help divers remain on course. We thank Commander Thurber for this information. Yellow lights would probably be best for this purpose; avoid the use of red, white or green lights. Due to space limitations, only a part of the knowledge appropriate for a topic can be presented. This letter re-enforces the point that training should be obtained before engaging in a new aspect of diving, such as night diving.

... After reading Taylor Caffery's Tank Explosion, May SDM, I wonder how many join with me in wondering about the likelihood of an explosion when charging a tank on the beach or on a boat using portable compressors.

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Underwater Forum

Should some safety factor be used, such as a partial charge or have the tanks in the surf, or some distance away from the boat, over the side, or other scheme?
ROBERT TOWNSLEY, PH.D.

OAKLAND, CALIF.

... Compressors themselves rarely cause explosions. Explosions usually occur when compressors are filling a tank that is faulty or has a faulty valve. Keeping your tank and valve in tip top condition is number one safety precaution against explosions. This issue has an editorial on Visual Tank Inspections.

If you are filling tanks from a portable compressor, Chuck Lamoreaux from American Bristol, a manufacturer of compressors, suggests you make sure the filtration system of the compressor has a relief valve for over pressurization. Also, there should be a burst disc in the filter chamber similar to the one used in a scuba tank valve. Putting a tank being filled into water does help cool it down, but the fill from a portable compressor is slow and does not generate the extreme heat that a larger compressor does.

... I have read with considerable interest your recent correspondence on diabetics and diving since the British Sub-Aqua Club has recently decided no longer to admit diabetics as divers.

One problem not brought out in your correspondence is that of the diabetic who becomes unconscious shortly after diving. In our experience this can pose severe problems both for his buddies and for any physician faced with him. Knowing that the victim is a diabetic, it is all too easily assumed that the condition is due to an insulin reaction and the appropriate treatment with sugar or glucose injections commenced. Unfortunately, diabetics as a class seem to suffer from accelerated cardio-vascular degeneration, no matter how meticulous the medical care of their condition, and for this reason are more prone to sustain bends. A recent incident in our experience highlighted this problem when a young diabetic surfaced from a no stop dive, developed weakness of his legs on the swim back to the boat and became unconscious as he was pulled in. He was treated on the assumption that his condi-



tion was due to his diabetes and it was not until several hours of intensive treatment with glucose that it was recognized that he had in fact sustained a severe combined cerebro-spinal bend and was transferred for recompression.

It is for these reasons as well as the problem of hypoglycaemic reaction in the water so well outlined by Dr. Stein which have prompted us to take the decision, albeit with regret, not to accept diabetics in the future as divers.

DR. JOHN BETTS

LONDON, ENGLAND

... I read with interest the article dealing with scuba tank explosions in the May issue of SDM, and wish to express my concern about statements made (or alluded to) in the article about not using water as a heat exchanger during filling.

As a diver who also teaches a course in thermodynamics, I carried out some "quick and dirty" calculations on the temperature rise which could accompany a pressure increase from 14.7 psi to, say, 2250 psi, if water were not used as a coolant. Theoretically, the temperature could reach an excess of 3500 degrees F! Even though it would not in practice reach this value, an increase of a fraction of this amount could prove to be catastrophic, since high temperatures can cause strains in the metals, and since different metals expand at different rates, explosions could easily result should they separate.

If water is used as a heat exchanger, the compression process could liberate as many as one quarter of a million calories of heat for a 71 cubic foot fill; this would, in effect, raise the temperature of a 30 gallon water container nearly four degrees F.

These calculations are, admittedly, only approximate, (and I would be pleased to supply them to interested parties) but they should serve to warn the operators of compressor facilities not to give a fill without using water to remove the heat generated in the process.

P.D. CRATIN, Ph.D.

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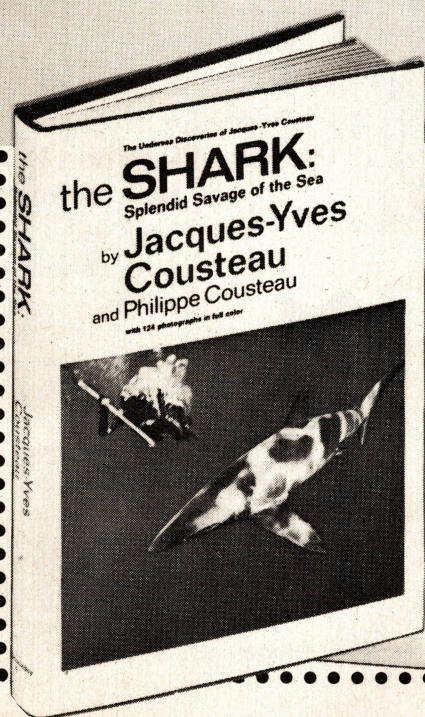
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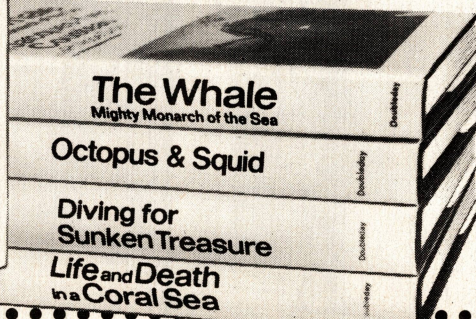
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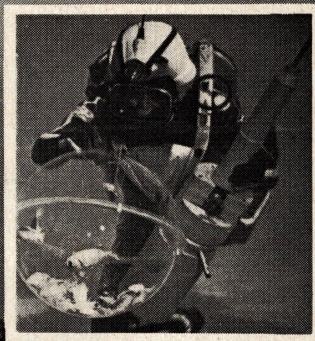
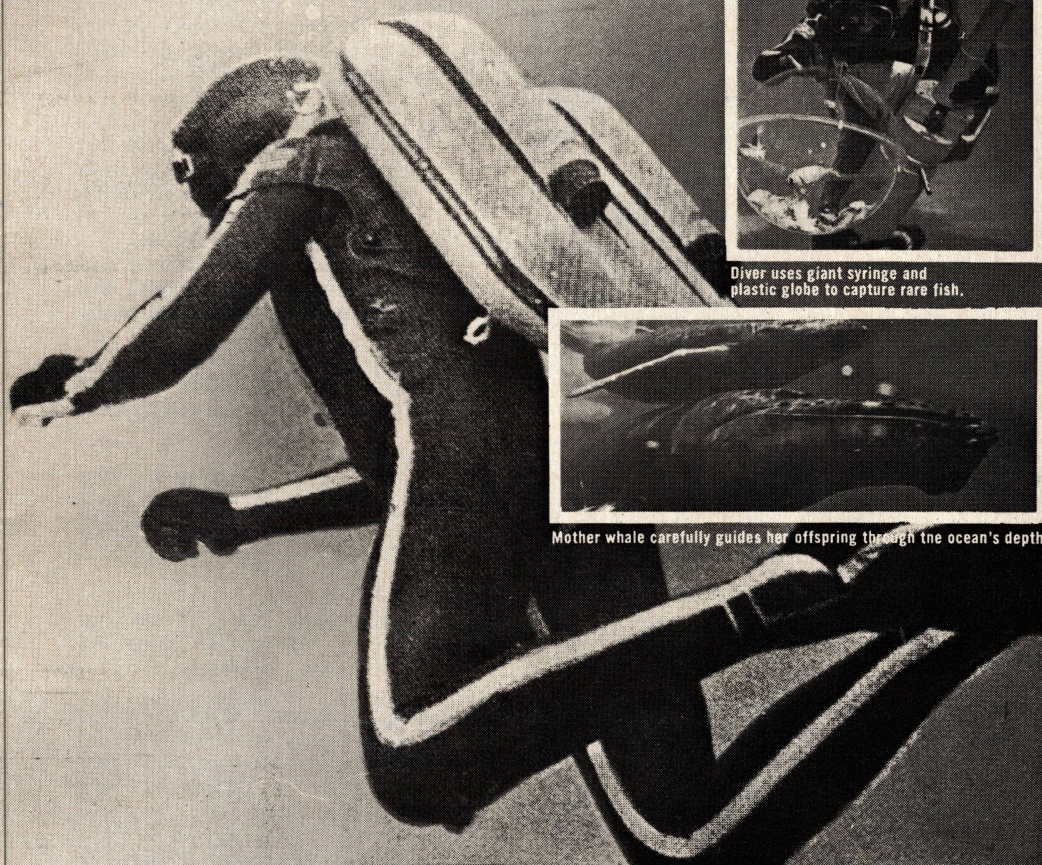
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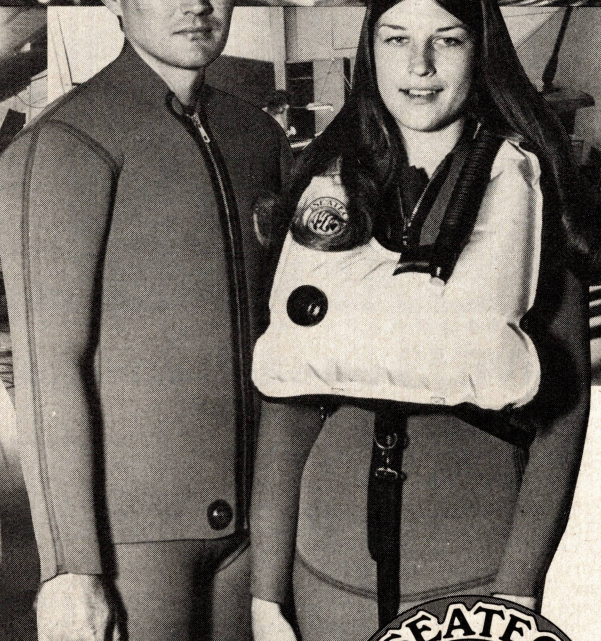
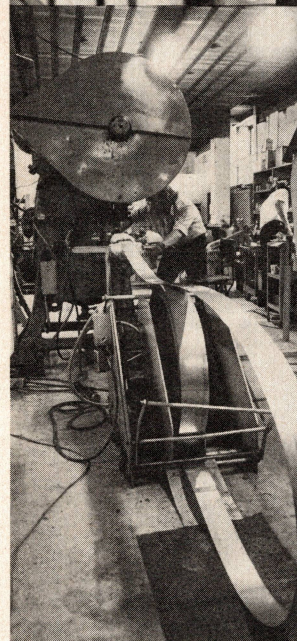
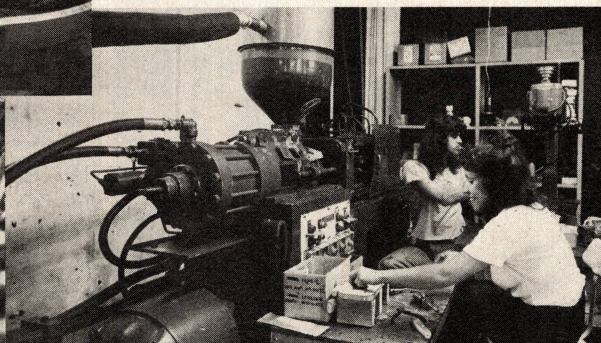
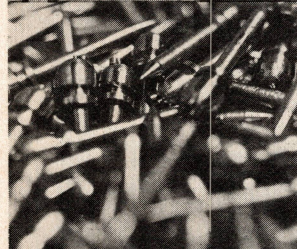
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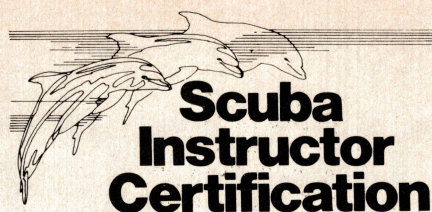


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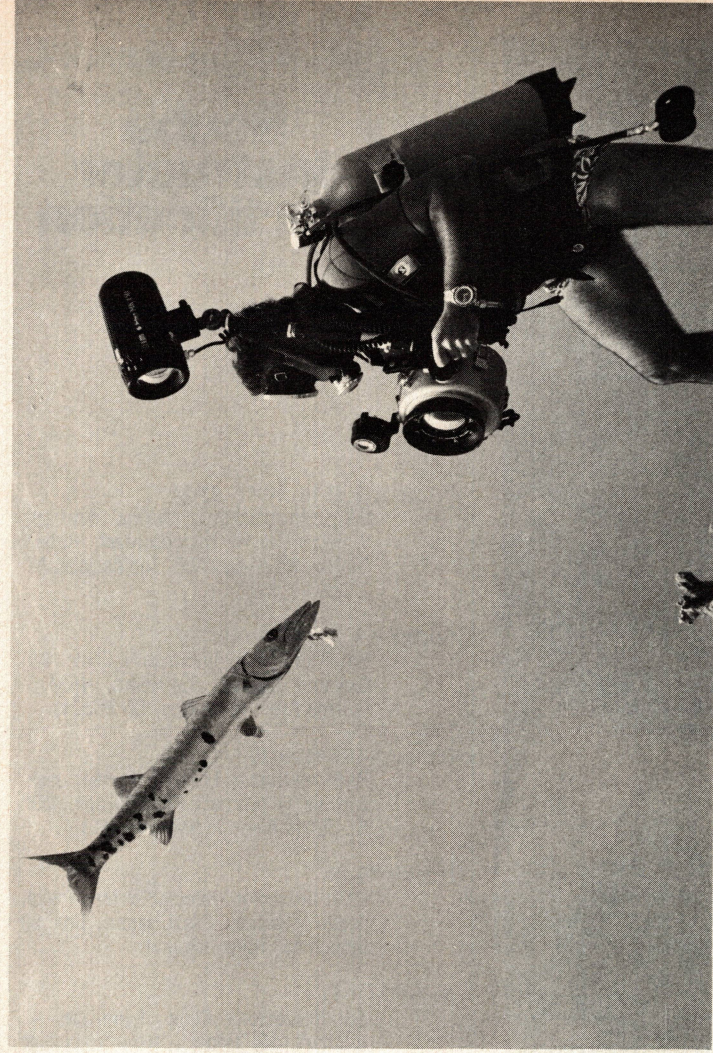
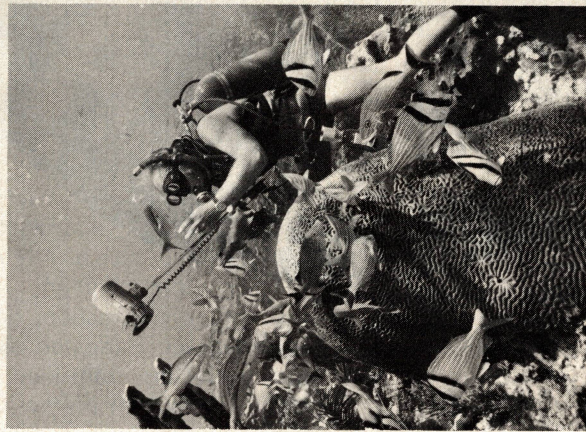
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sonville, FL (Contact: PADI College, 4593
St. Johns Ave., Jacksonville, FL)

October 10-15

PADI Instructor Training Course, Tokyo,
Japan (Contact: PADI Japan, Box 59
Ushigome, Tokyo, Japan)

November 1-11

SSI Instructor's Clinic, Louisville, KY
(Contact: SSI Hdqrs., 1634 S. College
Ave., Ft. Collins, CO 80521)

November 6-December 5

YMCA Instructor Institute, San Diego, CA
(Contact: Bud Hazen, 8152 Camino del
Sol, La Jolla, CA 92037)

December 5-10

NASDS Clinic, Florida (Contact: NASDS,
P.O. Box 7666, Long Beach, CA 90807)

December 13-19

PADI Instructor Training Course, Jack-
sonville, FL (Contact: PADI College, 4593
St. Johns Ave., Jacksonville, FL 32210)

December 20-26

PADI Instructor Training Course, Jack-
sonville, FL (Contact: PADI College, 4593
St. Johns Ave., Jacksonville, FL)

January 9-March 27

26th Los Angeles County Underwater In-
structors Certification Course, pre testing
Dec. 4-5 (Contact: L.A. County Dept.
Parks & Recreation, Underwater Unit,
155 W. Washington Blvd., Los Angeles,
CA 90015 (213) 749-6941 ext. 636)

January 9-15, 1977

NAUI Instructor Training Course, Hon-
olulu, HI (Contact: Roy Damron, 954
Kulua Pl., Honolulu, HI 96821)

March 4-6, 18-20

YMCA Instructor Certification Institute,
Olympia, WA (Contact: Bill Allen, Rt. 8,
Box 344-B, Olympia, WA 98502)



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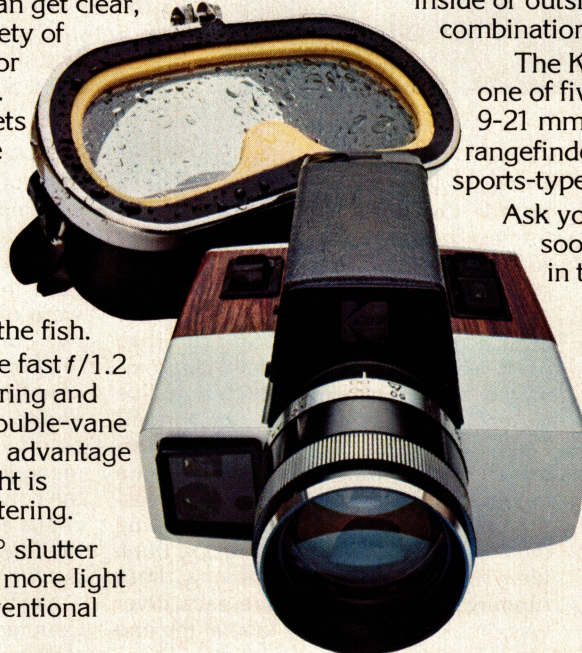
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And the enlarged 230° shutter opening allows about 40% more light to reach the film than conventional 165° openings.

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The Kodak XL360 movie camera (shown) is one of five XL models available. It has a 9-21 mm zoom lens, power zoom-lens control, rangefinder focusing, low-light signal, and a sports-type viewfinder.

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For free Kodak pamphlets, "Movies by Existing Light" (AD-17) and "Underwater Movies" (AD-15), write Eastman Kodak Company, Dept. 841 F, Rochester, N.Y. 14650. Please include a self-addressed #10 envelope and write "AD-17" and/or "AD-15" on the outside. No return postage necessary.

THE GREAT NORTHWEST DIVE-IN

By Emerson Mulford

Would you believe over 500 divers gathered on a sandy beach in Victoria, British Columbia, for an offshore hunt of golf balls? Actually the golf ball was a ticket, allowing the lucky finder to participate in a prize drawing that included such goodies as all expenses paid dive vacations to Honduras, custom wet suits, spearguns, camera cases, dive lights and a list exceeding 100 more prizes.

The Great Northwest Dive-In was sponsored by the National Association of Skin Diving Schools with the energy being supplied by dive store owners

Trek Diving in Victoria had made most of the arrangements and assigned areas of responsibility. While Sue and Louise Quick set up the registration desk, Don Bloye of Bellevue, Washington, and Bob Quick of Salem, Oregon, used inflatable boats to install dive flag marker buoys to set off the dive site boundaries. Finally, just prior to the first dive, they salted the dive site area with those treasured little white golf balls.

At 10:30 a.m. registration began with some 550 divers representing five states plus British Columbia and Alberta. Reg-

Competition between dive stores and within individual groups produced much verbal hee hawing, particularly with 40% of the divers being young ladies!

Fresh baked salmon, and all you could eat. That was the menu at the Dive-In's Saturday night supper. Normally, fresh baked salmon would be the high point of any evening — not this one, it was but one of several.

The evening's events took place at the Sooke Indian Community Center some 30 miles outside Victoria. Beginning with a mini logging show put on by the



photography by Author



The Dive-In, sponsored by NASDS, was promoted in the Great Northwest—the Oregon, Washington, and British Columbia area. Purpose of the event was to bring divers together for a variety of activities. Over 500 divers gathered for the fun.

throughout the Oregon, Washington and British Columbia area. Their purpose was quite simple — get a bunch of people together for a variety of diving activities, all centered around having fun.

Events for this first Great Northwest Dive-In began in the evening on April 22, 1976, with Club Aquarius, an NASDS travel organization, putting on the Aquarius Film Festival. Held in the beautiful and very funky Royal Theatre in downtown Victoria, over 400 people watched as Dick Anderson presented films on the recovery of Spanish gold off the Florida Keys and dive activities in exotic spots like Honduras, Baja, Mexico, and, of course, off the coast of Southern California.

On one of those beautiful Pacific Northwest sunny mornings, Willows Beach in Victoria was set up for the dive events bright and early. Sue Biggs of Sea

istration was brief — sign your name and leave your log book on the log book board. Once registered, the divers formed into groups, each group representing a participating dive store, with some 20 groups in all.

Beginning at 11:00 a.m. the first groups to dive were sent in. The dive itself was in shallow waters, approximately 30 feet maximum with only five to ten foot visibility. Ideal for a hunt! Each dive lasted 45 minutes and terminated with individual buddy team coming out, registering his or her treasured little white globe, and retrieving their personal log book. The log book idea was a good one, allowing those running the event to be sure each diver was, in fact, back on dry land at the end of each 45 minute dive period.

Nearly four hours of diving flashed by with an abundance of fun and frolic.

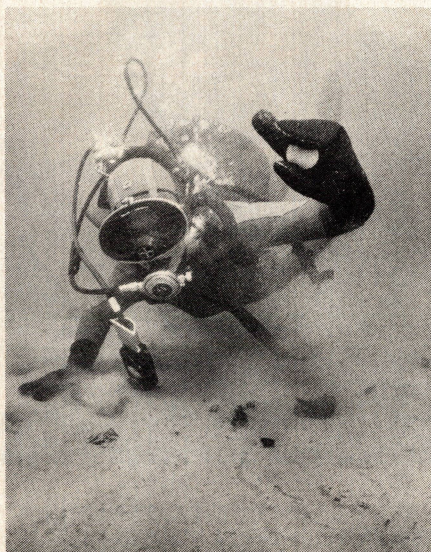
local Sooke Indians, it had to be the most entertaining and downright exciting evenings I've ever had.

Consisting of a series of competitive logging techniques between Sooke loggers, the entire 650 people in the hall were on their feet and cheering within five minutes. Starting with an ax throwing contest and progressing into sawing contests, chainsaw versus manpower, chopping contest and even a springboard contest. The flash of these tremendous axes, and the brute strength of the competition put everyone there atop chairs and tables cheering on their favorite logger. The energy and charisma of the loggers was incredible.

Next came the fresh baked salmon. Coupled with a mountain of salad, vegetables and bread, everyone had all they could possibly eat. Just after dessert (would you believe they served 650 peo-

ple all the ice cream they could eat?) Don Bloye of Silent World Divers in Bellevue, Washington, began the prize drawing. With the combined efforts of 15 dive equipment manufacturers donating prizes and Club Aquarius giving away two trips to their brand new Club Cay Diving Resort off Honduras, it took nearly one and a half hours to draw names and give away all the goodies. As with the afternoon dive, competition between representing dive stores became intense. Each store attempting to out-cheer the other stores each time a member of their group won a prize. With as many prizes that were given, everyone had plenty of chances at both winning and lending support. Once the drawing and ceremonies were complete, the evening was capped off with another 90 minutes of good electric rock'n'roll.

Relative to Saturday night, Sunday's dive activities were by individual store, with each group planning their dives throughout the Victoria area.

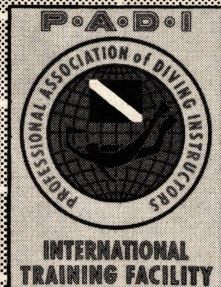


The dive area was salted with golf balls. Teams were given 45 minutes for the hunt.

Unlike the typical dive story that recounts some terrific activity that you've just missed — rather, hang on to your socks because there is more to come. On October 15, 16, and 17 of 1976 the Great Lakes Dive-In will take place. Headquartered at nothing less than the Abbey and Playboy Hotels on beautiful Lake Geneva, Wisconsin, this Dive-In should offer the midwest diver a dynamite weekend on the water. For those living in Southern California, you, too, are in luck. On November 19, 20, and 21, 1976 NASDS will sponsor yet another Great Dive-In, this time renting the entire harbor town of Avalon on Catalina Island.

You may have missed The Great Northwest Dive-In, but don't miss one of these next two coming up. I'll guarantee the best golf ball hunt, and for whatever else that's happening, it's got to be good — after all, you're going diving!

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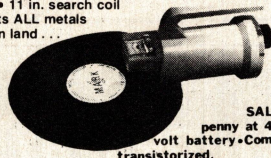
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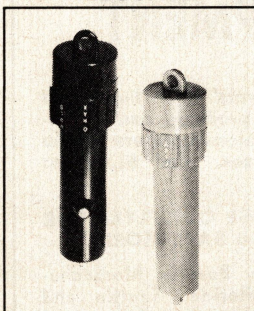
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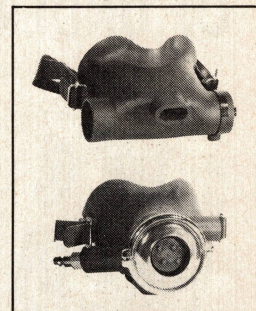
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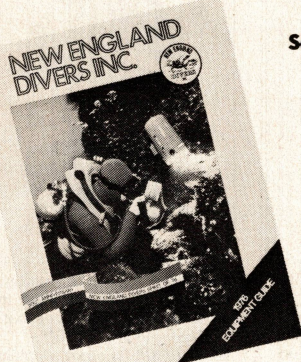
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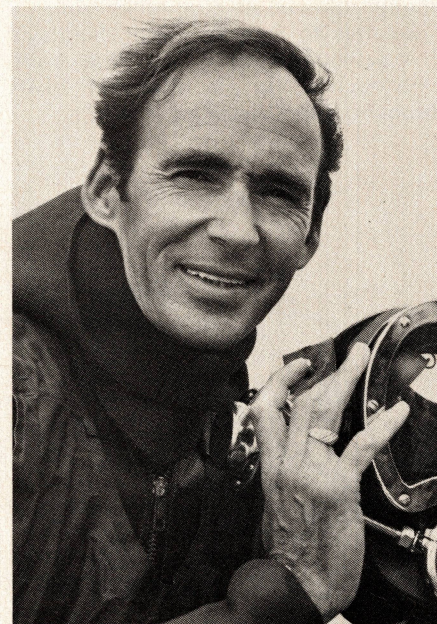


Mail order purchase of Life Support apparatus must be accompanied by proof of certification.

1975 NOGI Awards Winners

In the 16 years since its inception, the NOGI has become acknowledged as a high form of recognition of leadership in the diving community. Nominations for the awards are made by divers of the Society and previous winners. Recipients are selected from these nominations by the previous winners. These include such well known names as Jacques Cousteau, Gustav Dalle Valle, Dr. Joe McInnes, and Stan Waterman.

The four NOGI winners for 1975 are well known leaders in the various fields of diving. Their efforts have helped further knowledge and love of the sport and the underwater world. The winners for this year are as follows:



Arts – Ernest H. Brooks, II: Ernie Brooks has been world renowned for his exceptional work in underwater photography. President of the Brooks Institute of Photographic Arts and Sciences in Santa Barbara, California, he has continued to foster advancement in education and underwater photography.

In 24 years of diving, Brooks has explored and photographed waters all over the world from the Sea of Cortez to the Red Sea, from the South Pacific to the Arctic. His multi-media presentations have thrilled thousands of viewers.

Sciences – Dr. Robert D. Ballard: Dr. Ballard has been singled out for his significant contribution in the field of underwater geology. Ballard is associated with the Woods Hole Oceanographic Institution in Massachusetts. He has achieved distinction as a scientist, speaker, and writer. He is internationally recognized as one of our country's leading experts in deep sea geology.

Project FAMOUS (French-American Mid-Ocean Undersea Study), which was involved with the study of the deep sea floor, was coordinated and administered by Ballard. This operation, conducted on

the mid-Atlantic ridge, was the first major international cooperative ever attempted. Dr. Ballard personally participated in more than 60 dives in the U.S. submersible *Alvin* and at least one dive on the French submersible *Archemede*.

Distinguished Service – Dr. Melville Bell Grosvenor: Dr. Melville Grosvenor, former Editor-in-chief of the National Geographic Magazine and present Chairman of the Board of National Geographic Society, has promoted projects which have furthered the development of technical equipment, mounted under-sea expeditions, and publicized the new and exciting frontier under the ocean. National Geographic has produced several books and films on the underwater world. The magazine continues to carry articles by diving researchers in subjects ranging from shark studies to underwater archaeology.

Education – Chuck Nicklin: Chuck Nicklin has been instrumental in furthering education in both safe instruction of scuba diving and in learning about the wonders of the ocean.

Certified by NAUI, PADI, and NASDS, Nicklin has trained hundreds of divers. Since 1959 he has been involved in underwater photography. He has completed still and motion picture assignments for National Geographic, Warner Brothers, United Artists, and the BBC. Nicklin has participated in many underwater film festivals and seminars.

Chuck Nicklin has shown a constructive and continuing contribution to the advancement and promotion of diving through education and discovery of inner space.

Each NOGI winner has been presented with the statuette symbolic of this recognition award. For 1975, the thanks and admiration of the Underwater Society of America, and through it, the entire dive community, go to these men for their outstanding contributions. 🐠

Compensator Deflation Correction

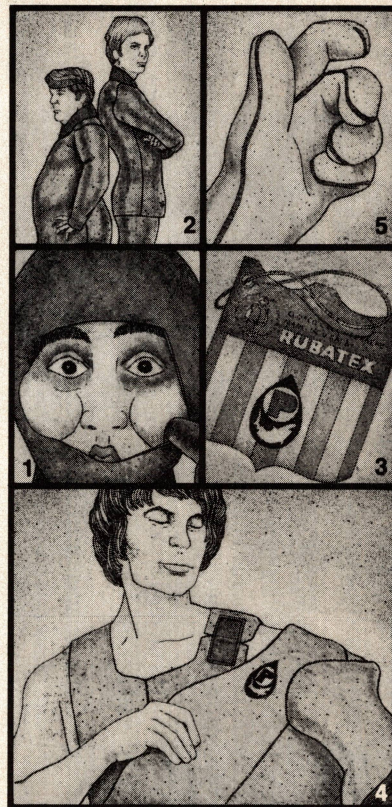
SDM's April '76 test feature on buoyancy compensators reported the Dacor Seachute BC-1 vest required 22 seconds for complete deflation of the air bladder. Subsequent tests on three different samples of the same model vest indicate an average deflation time of only nine seconds.

The Seachute BC-1 vest is a double bladder design with one compartment for air inflation and one for CO₂ inflation. Deflation time for the CO₂ compartment is somewhat longer, but the CO₂ system is designed specifically for emergency surface flotation and is not meant for buoyancy control. More information on the Seachute can be obtained from any Dacor dealer or by writing to the factory. 🐠

PARKWAY Exposure Garment Quiz

TEST YOUR KNOWLEDGE OF WET SUIT TAILORING

- 1) Wet suit fit is very important because it affects your:
 - _____ A. Appearance
 - _____ B. Warmth
 - _____ C. Overall comfort
- 2) Custom-made wet suits provide perfect fit for any diver, but off-the-shelf suits fit approximately:
 - _____ A. One percent
 - _____ B. Ninety-nine percent
 - _____ C. Fifty percent
- 3) The neoprene material used in wet suit manufacturing contributes to the fit of the garment by providing:
 - _____ A. Strength and flexibility
 - _____ B. Texture and color
 - _____ C. Thickness and lining
- 4) For maximum comfort the jacket of a coverall-type 2-piece wet suit should be:
 - _____ A. A standard jacket
 - _____ B. One size larger
 - _____ C. Specially shaped
- 5) Accessories such as hoods, boots and gloves fit best when:
 - _____ A. One size fits all
 - _____ B. They match suit size
 - _____ C. Selectively tailored



ANSWERS: 1) Improperly fitted suits look unattractive. And they can chafe, bind and irritate. Too tight and blood circulation is restricted. Too loose and air pockets circulate chilling water. Therefore, A, B & C are all correct. 2) With Parkway suits in over 15 sizes for men, women and children, B is the correct answer. 99% of all divers can get a perfect fit right off their Parkway dealers' shelves. Divers with extraordinary shapes, and those requiring extra pockets or pads, can order Parkway custom suits through these dealers. 3) Strength and flexibility, A, are most important. That's why Parkway uses only Rubatex G231N nitrogen-blown neoprene for their suits—sharkskin-two, nylon 2-sides and Brute Suit. Strong enough to withstand the rigors of diving, it's flexible too. So your arms and legs keep going longer with less strain. And it stretches up to 400%, enabling us to cut contours that cling to your shape. 4) Because they must be snug on bare arms and necks without being too tight around pant-top-covered torsos, coverall-type suit jackets must be specially shaped, C. Only Parkway cuts special jackets for this style. 5) You may have a big body, small head, medium hands and giant feet. So no one size is right for your accessories. Parkway selective tailoring, C, produces a full range of sizes to fit all divers. Boots with fin-kicking comfort and walking safety. Hoods that cling without choking. Gloves like the "Grabber" that let hands do what hands were designed to do.

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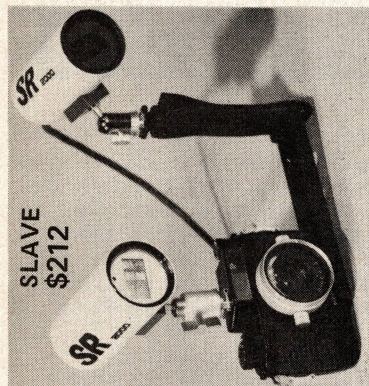
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Water Rescue Team Goes National

A group of certified scuba divers and certified Emergency Medical Technicians (E.M.T.) have pooled their skills to form the Underwater Rescue/Recovery Team for any type of water related accident. They are now in the process of expanding the organization from one based only in the greater New York area, to a national parent organization for existing underwater rescue organizations.

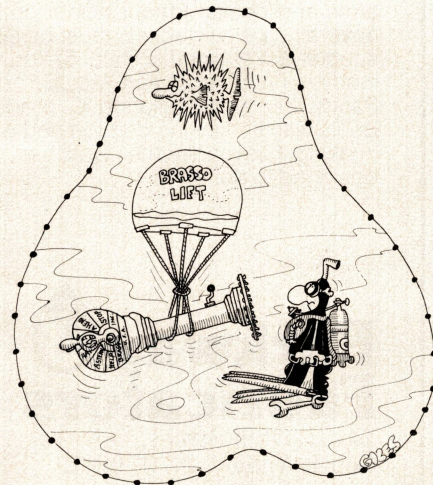
The corps is the brain child of New York resident David B. Burnham, a dive instructor and Senior Emergency Medical Technician Instructor, in addition to holding instructor certifications in C.P.R. and standard and advanced first aid with the American Red Cross.

The team is comprised of certified scuba divers and Emergency Medical Technicians or advanced first aiders with a nationwide organization such as the Red Cross, American Heart Association, NAUI, PADI or the YMCA.

They have been cross training everyone so that every member will be able to perform in both capabilities — dive for the rescue and then administer first aid quickly once a person has been recovered.

Fund raising functions, such as setting up stands in various public locations for people to have their blood pressure checked, enabled them to purchase two trucks. One truck is in the process of being rigged with the latest diving and rescue equipment — a portable decompression chamber, tanks, compressors, and medical support equipment. The second truck is to be rigged primarily with advanced life support equipment together with other rescue and medical equipment. Both vehicles have four wheel drive to get out on the beach when necessary.

For further information write: Underwater Rescue Recovery Team, Dept. SDM P.O. Box 32295, Jamaica, New York 11431.



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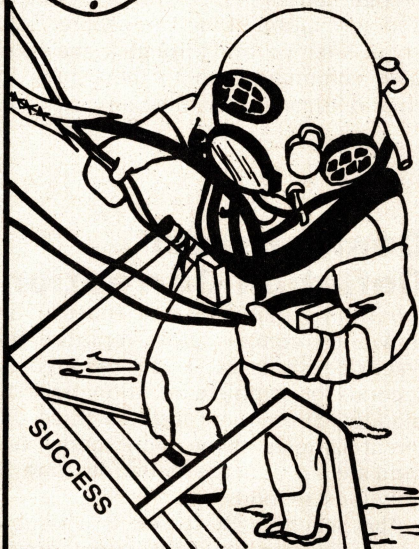
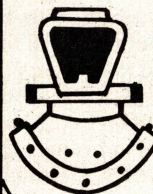
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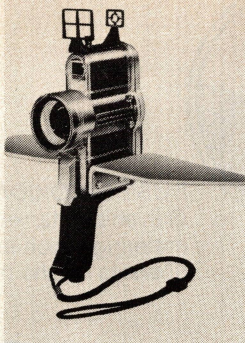


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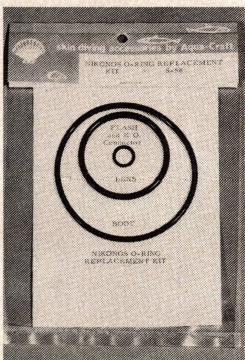


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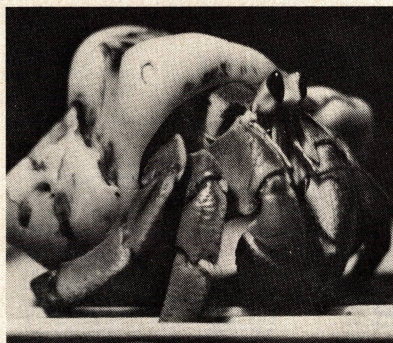
Send \$2.00 for all new 1975-76 Catalog offering two complete courses for Commercial Diving.



The new U/W housing for the Fujica 8 movie camera can be used to a depth of 130 ft. It is made of a polycarbonated resin and is equipped with removable stabilizer fins. Other accessories are: viewfinder, grip and tool. The camera is sold for \$124.95 and the housing is sold for \$89.95. They are available from Fuji Photo Film U.S.A., Inc., 350 Fifth Ave., New York, N.Y. 10001.

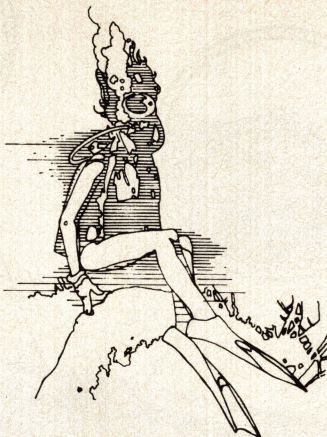


The Nikonos O ring Replacement Kit comes complete with one each of the three most important O rings on the Nikonos camera: one for the lens, one for the main body, and one for the flash connector. Protect your camera from flooding, change those O rings with this Replacement Kit. It is priced at \$1. Available from Aqua-Craft, Inc., 3280 Kurtz Street, San Diego, California 92210.

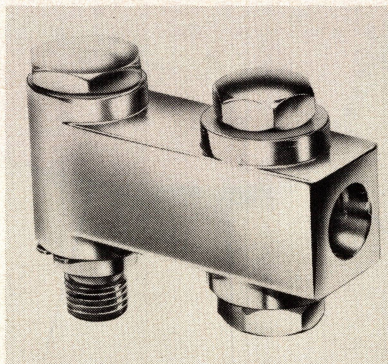


Grab-A-Crabs are crawling, climbing little critters that are great for your home, apartment, or office. Quiet and clean, watch them change shells, predict the weather, or just liven up your terrarium. Each has his own shell and no two are alike. Priced at \$3.98 with postage paid, they are available from Buster's Crabs, Inc., Post Office Box 107, Goulds, Florida 33170.

New Gear



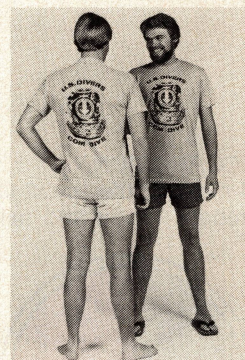
The Deluxe Utility Adapter is a low pressure adapter offering three additional low pressure outlets. It features heavy duty construction of brass with copper, nickel, and chrome plating. Perfect for octopus rig, buoyancy compensator inflation hose, or pneumatic underwater tools. It is priced at \$12. Available from: Scubapro, 3105 Harcourt Street, Compton, California 90211.



The Glasstar Watch Strap is made of nylon web with a stainless steel clasp made to fit most watches. It is available in black only. The "Quick-Draw" Instrument Strap has a new patented clasp for easy adjustment while underwater. It comes in two lengths and is available in yellow only. They are priced from \$2.50 to \$3.00. From Aquadive, 3600 Wilshire Blvd., L.A. Calif.

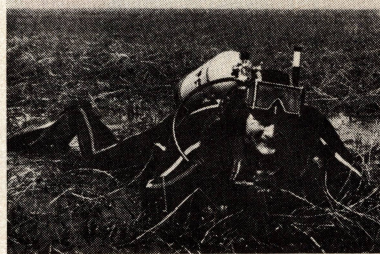


The C.S.S. Submersible Pressure Gauge features a large, fully luminescent dial, a rugged, triple chrome plated brass case and a 360 degree gauge swivel for easy reading. It is capable of indicating pressure to 3500 pounds psi. Selling for \$47.50, it is also available with a metric dial face. From: U.S. Cavalero, Inc., 3186 Airway Avenue, Costa Mesa, Calif. 92626.

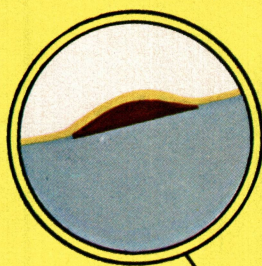


The Commercial Diving T-Shirt sports the commercial diving insignia and features the hard hat on the back. Made of 100% cotton, these T-shirts are completely machine washable. They come in blue or yellow and are available in small, medium, large, and extra large sizes. Priced at \$5.50, they are available from the U.S. Divers Company, 3323 West Warner Ave., Santa Ana, Calif. 92702.

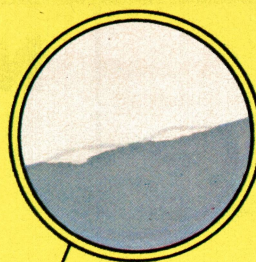
DIVE NORTH DAKOTA



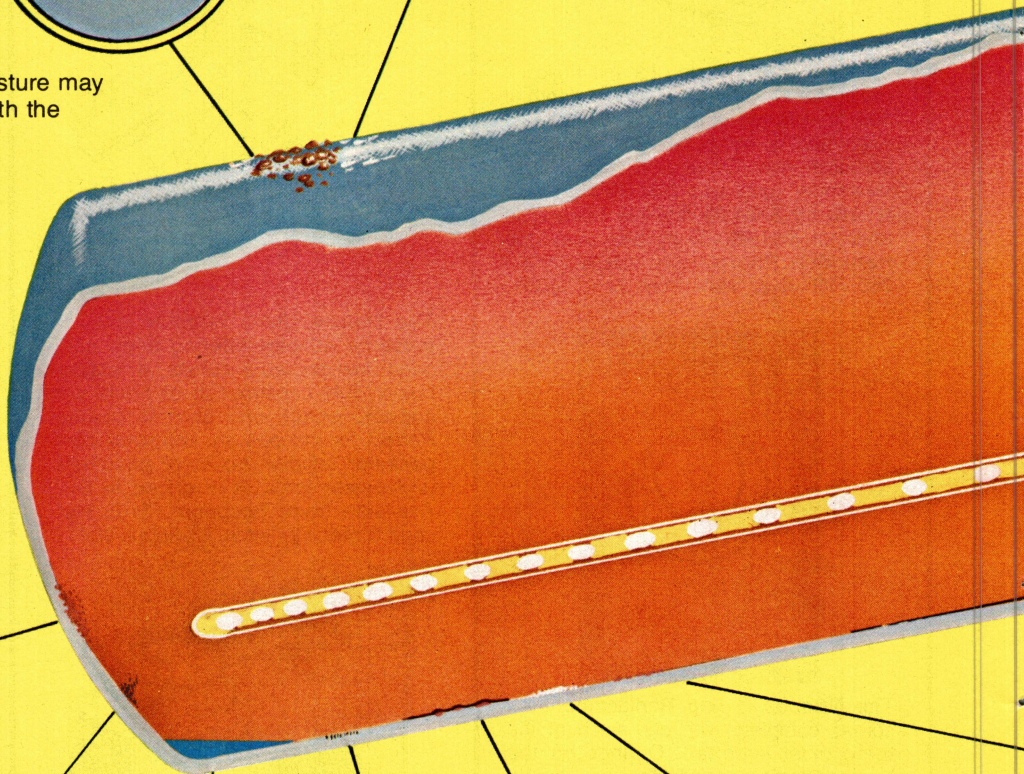
DIVE NORTH DAKOTA is a new poster that depicts the flavor and feelings of diving North Dakota. A perfect gift for the diver with a sense of humor. This black and white poster is 19x24 inches and is printed on poster stock. Priced at \$2 plus 50¢ handling. Dealer inquiries invited. Available from Butch Anton, Superfrog, Inc., Number 4, 7th Avenue South, Moorhead, Minnesota 56560.



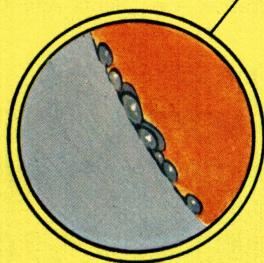
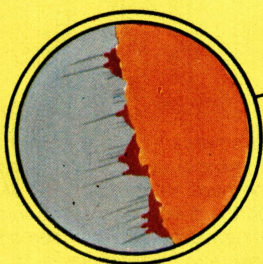
BLISTERING:
Under a tank boot, moisture may become trapped beneath the paint or epoxy.



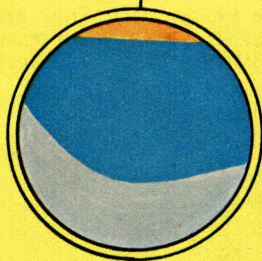
RUST OR OXIDATION:
Galvanized tanks may incur a cratering which leaves white deposits on the metal.



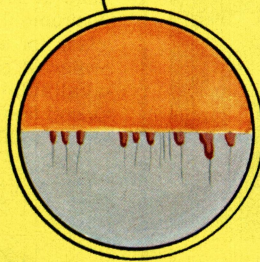
UNIFORM CORROSION:
The overall metal of the scuba tank becomes corroded, thinner and fails.



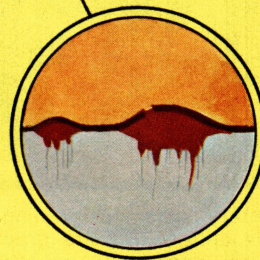
SLAG:
Created when the tank is galvanized on the outside and areas are missed in sand blasting.



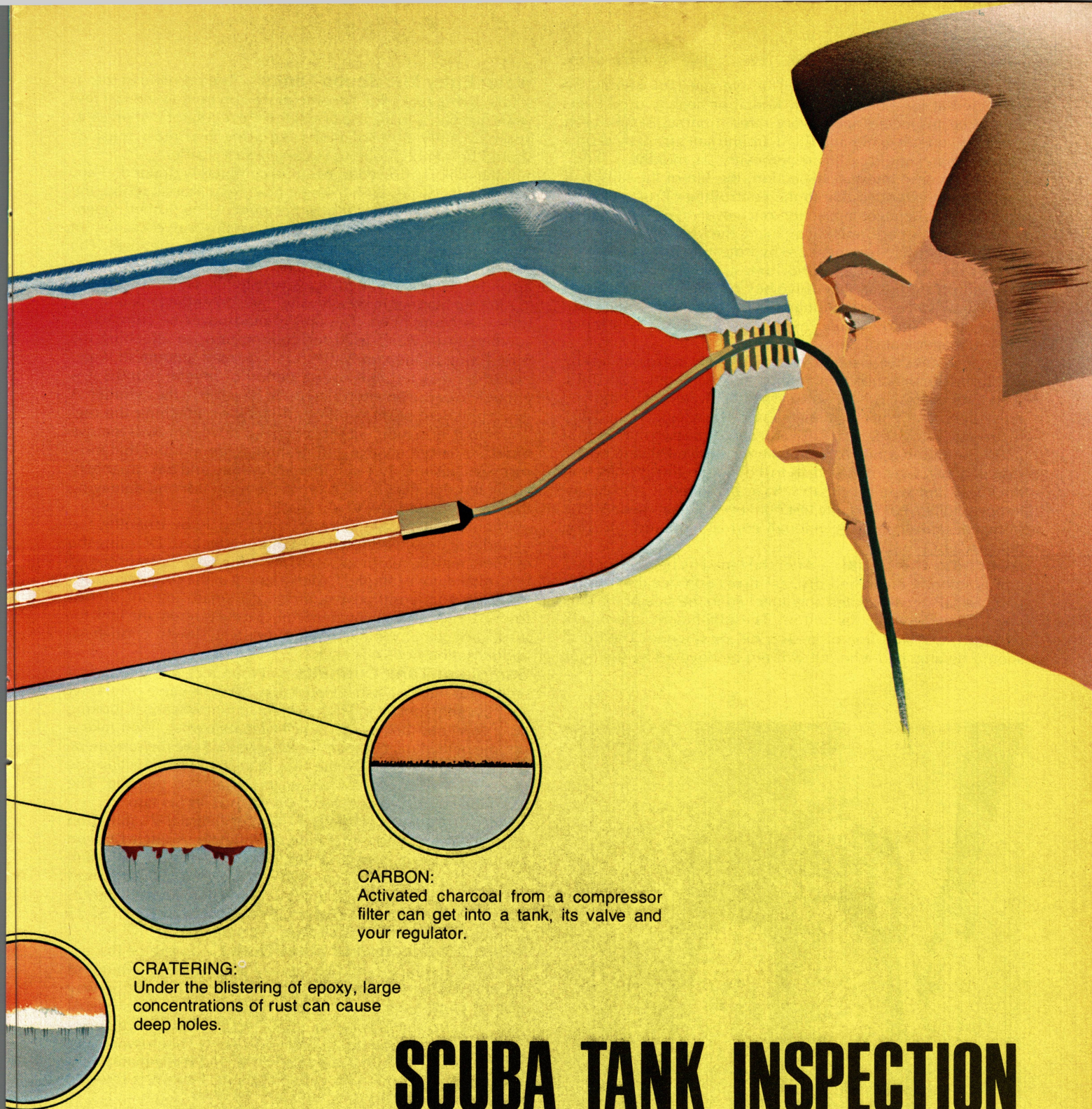
WATER:
Condensation of moisturized air inside a tank causes rust or oxidation



PITTING:
One of the more serious forms of corrosion, it is localized and causes holes.



RUST UNDER EPOXY LINING:
Water in contact with the tank's metal can cause rust if there is a pinhole in the epoxy.



CARBON:
Activated charcoal from a compressor filter can get into a tank, its valve and your regulator.

CRATERING:
Under the blistering of epoxy, large concentrations of rust can cause deep holes.

ALUMINUM OXIDATION:
Oxide deposits may become loose and get into your valve and regulator.

SCUBA TANK INSPECTION

New Standards And Procedures

It is crucial to scuba safety that each diver has his scuba tank internally inspected at least once a year. The diver is charged a small fee and in return, he receives the satisfaction of knowing the internal condition of his tank. If the tank is free from damaging internal corrosion, an inspection decal is dated and attached to the tank. PADI has recently established a national equipment inspection program, with specified standards and procedures for internal tank inspection.

Much of the information provided in this procedure is the direct result of an extensive taped interview with Al Thompson of Professional Scuba Repair in North Hollywood, California. Al has shared his time and methods mainly for safety in the sport. Some of the information also is provided by the University of Rhode Island in their Scuba Safety Report Series, Report No. 1, *Corrosion of*

By Jim Hall and Al Thompson

Steel Scuba Tanks, a thorough, investigative research work.

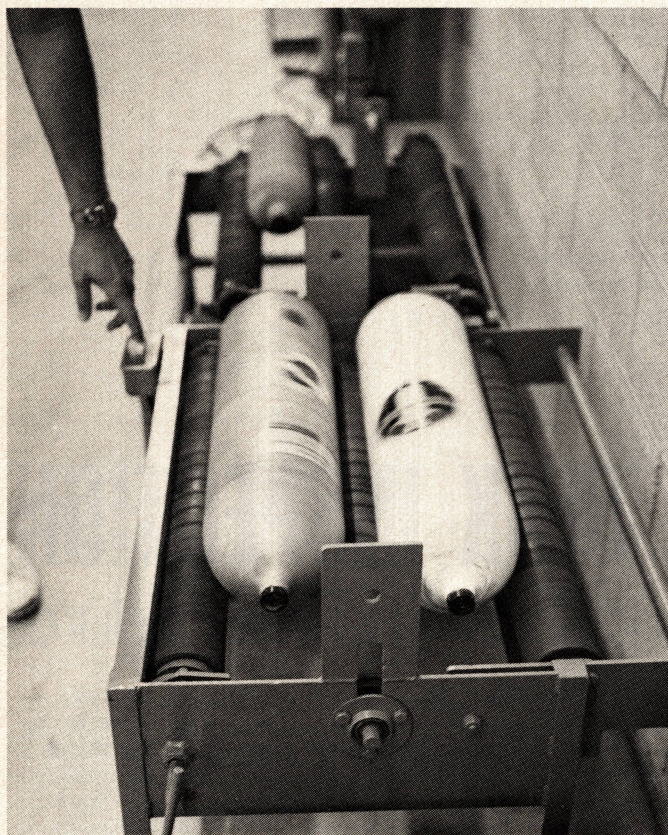
INSPECTION PERIOD — The average tank should be inspected at least once a year. Rental or heavily used tanks should be inspected once every three months. A tank used constantly in salt water and filled around salt air, such as on a charter boat, should be inspected every six months.

With periodic internal inspection, the life of the tank will probably be extended due to the controlling of rust before it does serious damage. Inspection once every five years, when the hydrotest is performed, may mean the loss of the tank due to excessive rust. Also, there are hydrotesting firms that never inspect the inside of tanks prior to test.

Based on studies at the University of Rhode Island, it was found that five years is too long a time between examination of scuba tanks. Yearly visual inspections will provide a much safer management of tank corrosion.

Six new tanks were subjected to a 100 day corrosion test by the Professional Scuba Repair Shop at a temperature of 104°F with interior fresh or salt water. The freshwater tanks showed only superficial corrosion and subsequently passed the DOT hydrotest. Two of the four saltwater tanks (the two that were at 2200 psi and in a horizontal position) showed severe corrosion damage. One of these had lost over two-thirds of its wall thickness and would probably have exploded if we had attempted to move it from the test bunker while charged. All the saltwater tanks contained enough corrosion material to clog the valve or regulator.

Attaching the Decal — After the tank has been inspected and is smooth, clean and dry, an inspection decal — in this case the EIP decal is dated and attached to the side of the tank about 12 inches from the bottom. The attachment area should be clean, dry, and free of grease, oil, or silicone. The decal should be attached where it will not be covered by the back



Tanks are filled approximately half full of cutting material and are allowed to rotate on their sides to clean the inside walls of unwanted corrosion. This process is known as tumbling.

pack or exposed to excessive wear.

Water Entry into Scuba Tanks — The problem of rust in scuba diving tanks has become more apparent in the last few years due partly to the use of single hose regulators. At present, approximately 80% of tanks requiring hydrotest must or should be tumbled due to excessive rust inside.

If the tank is allowed to become completely drained of air, and is in the water with a single hose regulator attached, the purge button can purposely or accidentally be pushed, opening the second stage valve. Opening this valve causes an uninterrupted route for fresh or salt water to the tank. The solution is to never allow the tank to be completely empty of air. If the tank is emptied, its valve should be turned off.

Another manner in which water may enter the tank is at the time it is being filled. The tank should never be completely submerged in water used for cooling prior to attaching the filler fitting to the tank valve. Only a small amount of water would be injected, but over a period of several months it is enough to cause powder-like rust to develop in the cylinder. A good practice, prior to filling the tank or attaching the regulator to it, is to momentarily open the valve. This will remove moisture from the valve and its inlet. Keep in mind that most rust particles in a dive cylinder are minute and are capable of going through the center filter of the regulator and damaging the high pressure valve.

Another way in which rust is caused is by draining the cylinder of its air without the regulator attached. Draining the cylinder may be required before it is allowed to be transported by airplane, for example. Rapid draining of the cylinder causes moisture condensation resulting in a small amount of rust forming internally. If you must remove the air from the tank for inspection or any other reason, drain it slowly enough so condensation does not occur.

Sample of Tank Contents — When a customer brings a tank in for internal visual inspection, take the valve off and let the customer look at it. Then explain to him what he is looking at. If someone brings the tank in for its owner, then take a sample of the tank contents for the owner. Take the sample by placing a plastic bag over the neck of the tank, turning it upside down, and pouring any foreign material into the bag. The individual can then see exactly what was in his tank.

Tank Inspection Lights — Proper internal illumination for visual inspection is of utmost importance. A single bulb on the end of a rod or cord is not sufficient to determine the extent of the rust, unless there is a large deposit. A proper light must be used to completely illuminate the inside such as the In-Sight light made by Professional Scuba Repair, 5725 Cahuenga Blvd., N. Hollywood, CA 91601.

Internal Inspection of Steel Tanks — Insert the inspection light and move the light slowly around the perimeter of the tank. Make a close and thorough inspection all the way around continuing down to the bottom. An internal visual examination should show the tank free from excessive corrosion, pitting, or dangerous defects. The tank should be free of moisture, rust, carbon, slag, pits, scale, and loose material. A perfect tank is sometimes called a cherry tank; it is smooth, clean, shiny, and dry.

Any rust, even a light uniform rust, should be removed by tumbling. Any rust will cause problems because it will eventually break loose and go through the valve filter and contaminate the valve. Then it will enter the regulator and damage the valve seats. Most rust particles are sharp and will quickly damage the valve and regulator.

A rusty, heavily scaled tank should be tumbled and re-inspected. If it is apparent that the rust cannot be removed without excessive tumbling, and it is heavily pitted, the tank should be condemned. Sometimes the pits cannot be seen until the scale is removed.

At the University of Rhode Island, a steel tank stored on its side for 100 days at 2200 psi with a little sea water in it had a thick layer of corrosion along the entire cylinder length. The surface color of the corrosion was brown and was a deep black

color at the metal surface. Large areas of pitting occurred under the entire layer of corrosion, and the tank was condemned. The pitting damage was found to have destroyed more than two-thirds of the cylinder wall thickness.

Forms of Corrosion (University of Rhode Island) —

Corrosion can take many forms of attack. In some cases, it may occur over the entire metal surface. In other cases, it may be very local and only attack specific metal areas. Generally, the more localized forms of corrosion are the most dangerous, as they can destroy the structural strength of metals more rapidly.

Uniform corrosion: During uniform corrosion, the metal surface corrodes evenly. The metal becomes thinner in all areas and eventually fails. If uniform corrosion were the only type of corrosion found in scuba tanks, it would take a relatively long time for the cylinder walls to corrode all over to the point where they were dangerously thin.

Pitting corrosion is one of the more serious forms of corrosion. It is localized in attack and can quickly cause holes to be formed in the metal. These holes may be fairly large or very small. In most cases, they are small with the hole diameter being about the same as the depth. Also, pits are usually hidden by surface corrosion products. They may extend deeply into the metal body so that the sub-surface damage is often greater than is indicated by surface appearances.

If pitting occurs in dive cylinders, the damage effect can be very severe. Once the pit has started to form, the rate of corrosion attack may continuously increase and easily penetrate the cylinder wall in a relatively short time. Sometimes the pit may cause local thinning in a large section of the cylinder wall, or even act as a stress riser that could cause catastrophic failure of a pressurized tank.

New Tank Inspection — A brand new tank sometimes will have factory slag on the walls in small patches. The patches of slag are areas that were missed when the tank was sand blasted. Slag is created when the tank is galvanized on the outside. It is heated to about 850°. If there is any foreign material in the tank, it will be fried and become very harsh material on the walls. The material will slowly, but surely, come off over a period of time. It may take years to come out of the tank. When it flakes off the walls of the tank, it travels through the valve, into the regulator and damages the valve seats. So, even a new tank should be completely clean inside.

Carbon in Tanks — If the inside of the tank is dry and black, it is covered with carbon. A very close look at the carbon on the bottom will detect a sparkle. The carbon is actually activated charcoal that has come from a compressor filter. The top of the filter must be packed very well with a material that will not allow the loose fine charcoal to travel through the compressor system. This problem does not exist with cartridge type filters.

Carbon is not detrimental to the tank, but it is to the valve and regulator. Carbon will eventually build up on internal moving parts and block valves from closing.

Epoxy Lined Tanks — Some tanks are lined internally with epoxy in an attempt to prevent rust from forming on the bare metal. If the epoxy is injected evenly into the cylinder and completely covers the walls, it will prevent water from coming in direct contact with the metal. However, if there is a pinhole in the epoxy, water will be able to work its way under the lining and rust will form, lifting it loose.

In some cases epoxy lining has a tendency to flake. The very small particles of loose lining will travel through the valve and into your regulator, contaminating both. Lining materials have not been sufficiently perfected, as of this date, to where they can be considered flawless. For this reason, several manufacturers have discontinued lining cylinders. A lined cylinder must be inspected as often as an unlined cylinder.

Basically, what you are looking for is small bumps, blisters, or ripples in the lining. These are caused by water that has entered pinholes in the lining and caused rust to form. The force of the corrosion lifts the lining away from the wall and causes more rust to form. Blisters eventually split open. Pieces

of the fractured lining break away from the walls.

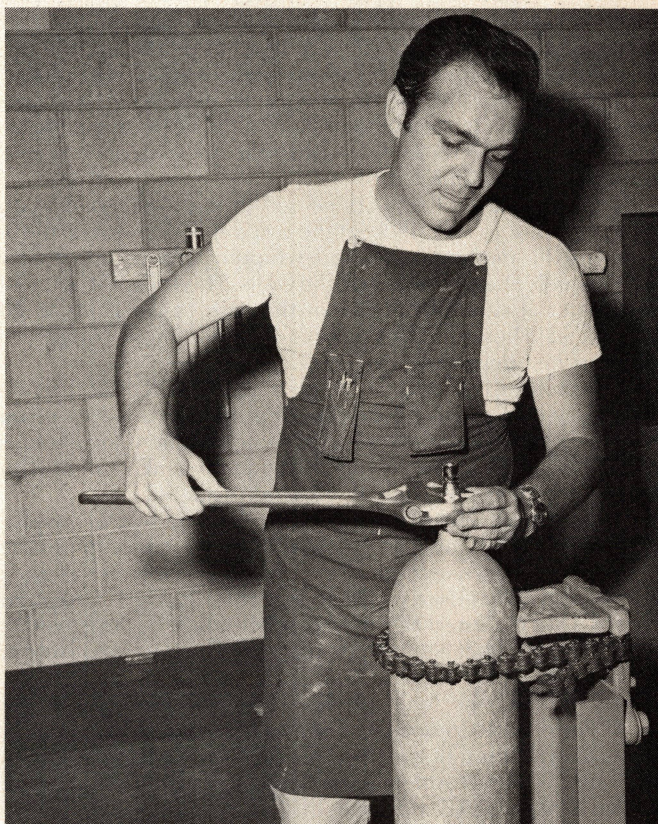
Small flakes found inside of a relatively smooth lining is an indication that the lining is breaking down. The lining should be tumbled out so that the tank walls can be examined. Brown spots in a white lining is an indication of rust.

Aluminum Tanks — Rust will not, of course, develop in an aluminum tank. However, the tank may develop a chalk colored oxide if moisture, especially seawater, is allowed to enter. If the oxide deposits become loose in the tank, you will have foreign materials capable of traveling through the valve and regulator. Therefore, regular inspections are essential.

Aluminum scuba tanks have an anodized protective coating, inside and out, to prevent aluminum oxidation. If the anodize coating is damaged and the aluminum is scratched or gouged, an oxide will form on the damaged area. This natural chalk-like deposit will actually protect the damaged portion, preventing further corrosion. If desired, the damaged outside area can be restored to its original appearance by doing the following: Remove the oxide formation with a knife or steel wool. Cover the area with the special polyurethane enamel available from a company that distributes aluminum tanks. The bottom of an aluminum tank can be etched away by a non-drain type boot.

Internal Cleaning — One of the most efficient methods used in cleaning scuba tanks is the use of hard stones, either made of carbide or aluminum oxide. Various other materials sometimes used are ball bearings or glass beads. The tank is generally filled approximately half full of cutting material and is allowed to rotate on its side for varying periods of time determined by the amount of rust. This process is commonly known as "tumbling".

Most hydro firms are not aware of the problems involved with the thin walled scuba tanks. Also, most of the general run



Tank valves should not be removed unless proper tools are available. While locked into chain vice, a wide jawed wrench should be used across the face or valve opening to remove the valve.



In-Sight light made by Professional Scuba Repair allows proper illumination for visual inspection. The average tank should be inspected at least once a year. A condition report tag is usually attached to the tank when it is received by the scuba repair shop.



of the mill industrial tanks they normally test are always used in an upright position. Scuba tanks, of course, very seldom stay in an upright position. If the hydro firm has tumbling facilities, acid is generally used with various types of abrasives to speed up the process. Acid, of course, can become very dangerous because it has a tendency to remain in the pores of the metal. Under extreme conditions, it is possible that, at depth, the acid fumes could become toxic.

Some firms use chains connected to a rod attached to an electric motor to literally beat the rust deposits out. The problem with this method is the chain whipping around inside only superficially shears the rust off the walls. This means that latent rust material can still remain in the tank causing pits to go unnoticed. Therefore, this technique only removes large and obvious rust deposits.

Sandblasting is another method sometimes used to clean the interior of diving tanks. However, this method does not clean the neck area. When the sand is removed, minute particles remain in the pores of the metal. When the tank is filled with air, it stretches and releases the sand inside.

Condemning Tanks — After tumbling and hydro, a visual inspection should be made to determine the condition of the tank. The explosive energy of a scuba tank is both devastating and deadly. Therefore, if deep pits are observed, structural damage has occurred and the cylinder should be destroyed. It is still possible that a tank with deep pits could pass hydrotest. If moisture ever enters the tank again, it will attack the pits.

Condemning the tank can be done by stamping out the I.C.C. (Interstate Commerce Commission) or D.O.T. (Department of Transportation) specifications or by boring a hole in the tank. A tank cannot be restamped for a lower pressure rating, it must be condemned.

Contaminated Valves — A fact unknown by many, and often overlooked, is that the tank valve is a natural trap for rust and salt. Even though a tank is cleaned, rust or salt may be trapped in the valve passages. During operation, these remaining particles in the valve may loosen and travel into the reg-

ulator and cause damage to internal parts. Therefore, if any loose deposits are found in the tank, the valve should be disassembled, cleaned, lubricated, and defective parts replaced. This will insure a clean system throughout.

Removing Valves for Tank Inspection — There is more to tank inspection than just inspecting the tank. If you don't remove the valve correctly, you can ruin the valve.

Valves should not be removed unless the proper tools are available. The tank should be locked into a chain vise. A wide-jawed wrench should be used to remove the valve. The wrench should be used across the face or valve opening on a valve without flats for a wrench. If the wrench is used on the side of the opening, the face will be crushed and form an oval hole. If the wrench is too narrow, it will dig into the valve.

Installing Valves After Tank Inspection — If a valve is too tight to screw in by hand, a wrench should not be used to start it down. It has an "O" ring seal and the threads on the tank should be retapped. If a wrench is used to force the valve in, the threads on the brass valve will be stripped. If full air pressure is put into a tank with a valve that has stripped threads, the valve may be forced out. The same care should be used when installing a valve in an aluminum tank.

Teflon tape should not be wrapped around valve threads that have an "O" ring seal. The Teflon will not form a seal. Small pieces of Teflon can get into the valve and regulator and under valve seats. A drowning was reported that was caused by a small piece of Teflon causing a regulator to fail.

Blowout Plugs & Burst Discs — Old valves with lead blowout plugs should be replaced. They will usually not blow at the proper pressure; and if they do blow, someone may be injured. A test was run by Al Thompson who applied up to 10,000 lbs. against a lead plug, and it wouldn't blow.

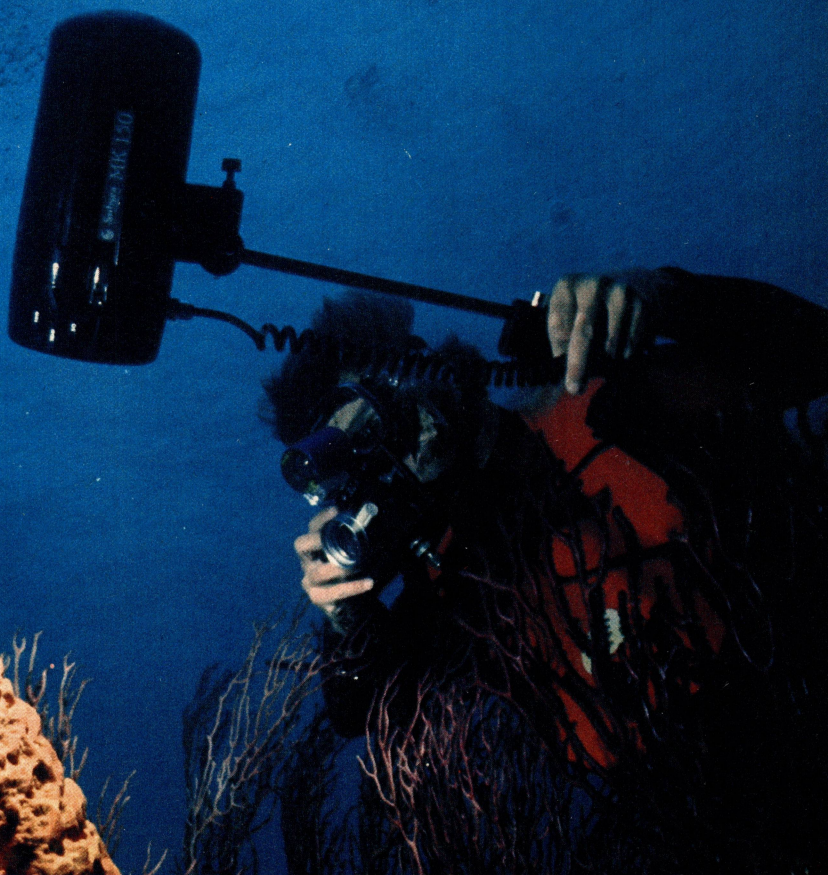
The proper burst disc should be installed in a valve. If a burst disc that is designed for the 2250 psi tank is installed into an 1800 psi tank, the tank will blow before the disc.

Handling Precautions — The following precautions were developed from extensive testing and experience:

1. Whenever a tank is drained completely during a dive, its valve should be removed and it should be checked for water.
2. When water is found in a tank during visual inspection, it should be steam cleaned or thoroughly rinsed in fresh water, then warm air dried. Any rust should be removed by tumbling.
3. Tanks should be stored in a vertical position when possible. Tests indicate less wall thinning in this position. Also, if water should be in the tank, it would act mainly on the bottom area which is thicker.
4. Tanks should never be stored for long periods of time fully charged. They should be stored with some internal pressure, perhaps 50 to 100 psi to keep out of water.
5. Tanks should not be stored in an excessively hot place.
6. Tanks used in saltwater areas should be internally inspected every six months and at least yearly in freshwater areas. Rental tanks should be inspected every three months. If some rust can be seen in the tank, it should be tumble cleaned to remove products that might get into the breathing air.
7. Tanks should be charged in a separate space protected by reinforced concrete on all sides. The dive shop operator should realize that if a tank explodes in its water bath, the shock is transmitted without loss to the walls of the bath which then will shred and behave like shrapnel. If space considerations absolutely prevent walling off the charging area, then a large, plastic container should contain the scuba tank under charge. If an explosion does occur, flying plastic is vastly safer than flying steel. Further, the more water surrounding the tank, the more the explosive force will be soaked up, accelerating the water and the less chance there will be of pieces of tank reaching a bystander. Under no circumstances should scuba tanks be charged in a metal water container.

For more complete details regarding high pressure cylinders, references may be obtained from pamphlet #C-5, entitled *Cylinder Service Life Seamless, High Pressure Cylinders*, by Compressed Gas Assoc. Inc., New York, N.Y. 

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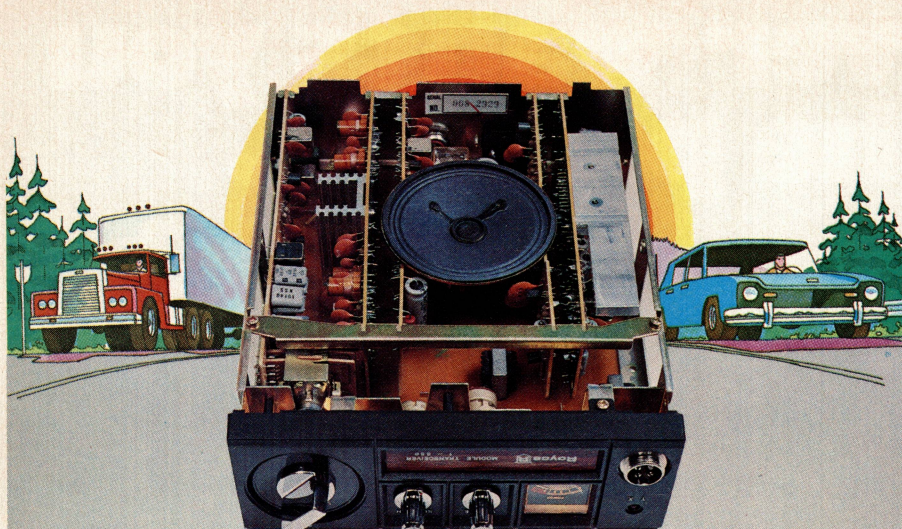
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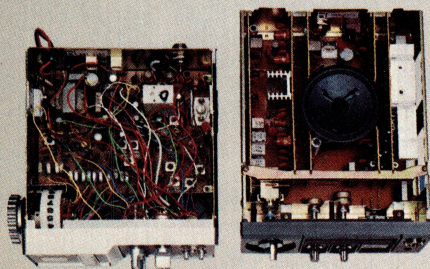
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Royce

Bayleysuit's New Plush

SDM Product Review

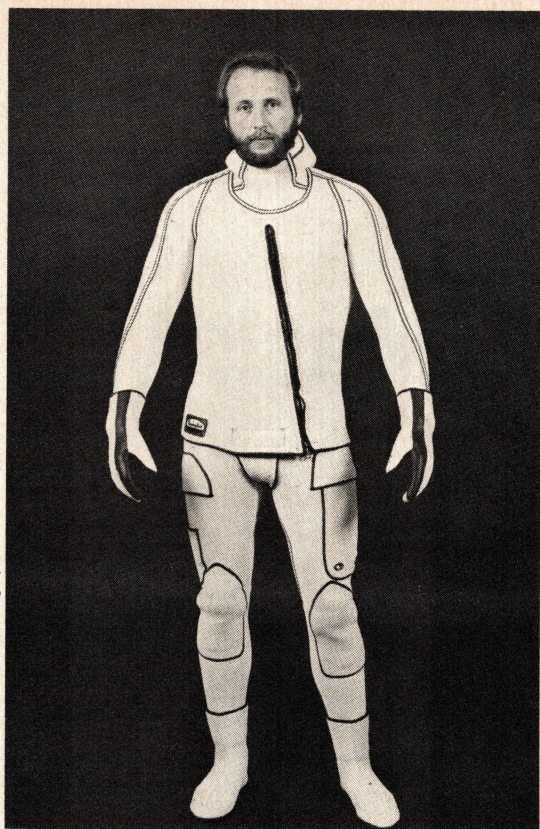
By Jack McKenney

Depending on what expert you talk with, the dropout rate in diving is anywhere between 50% and 80%. The reasons are numerous but one of the most common complaints is that people are not warm and comfortable when they enter cold waters. How many times have new diving students suffered through their check out dives because of ill fitting wet suits, or possibly because of no suit at all? Even a short immersion in cold water will result in a very uncomfortable diver if he is not properly dressed. A cold diver is an unhappy diver, and an unhappy diver is a diver that is likely to become a diving dropout.

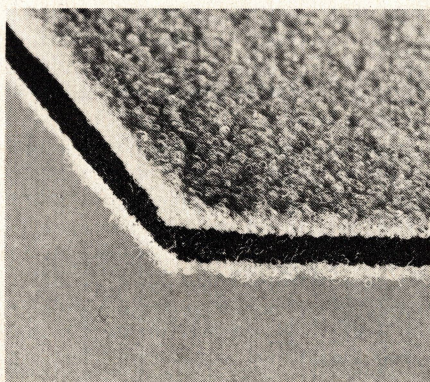
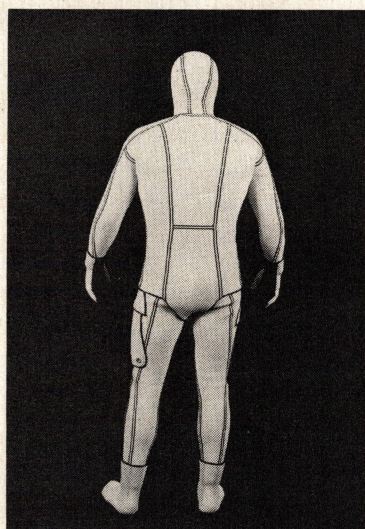
In this day and age, there is no excuse for a diver to be cold in the water. With a dry suit, or a well fitting wet suit, a diver can remain in the water for long periods of time enjoying his sport the way he should. Still another consumer complaint has to do with cosmetics. Women especially are prone to shying away, from all black and opting for oranges, blues, and reds. And, from an underwater photography standpoint, a picture will be more pleasing if the diver is wearing a colored suit rather than a black one.

Neoprene has come a long way since its inception many years ago. One of the main improvements has been the addition of nylon, either on one side, or both sides of the rubber. This thin coating of nylon was originally fused to the neoprene to strengthen the rubber and to make it more durable. It also made it easier to doff and don the suit. No longer did a diver have to lubricate his suit with talc, baby powder, or soap. Just about any of the old timers who have used a smooth skin neoprene suit and then a nylon covered neoprene suit will agree about the advantages of the latter.

And now, enters the "Plush" wet suit. BayleySuit, Inc., one of the oldest wet



The pictured wet suit is Bayley-Suit's Eureka 100 Custom Dive Suit. Catalogue #35-2, this suit was custom prepared for Jack McKenney with some of the options available for the new Plush suits, like: thigh pocket, knife holder, and knee pads.



The above is a close-up shot of the actual Plush material itself. Because of a special weaving process, the nylon coating on the neoprene is thicker and softer. The nylon appears to be tiny curls.

suit manufacturers in the industry, recently introduced a new material that is so soft, it's like slipping into a terrycloth bath towel. Working with St. Albans Rubber Company of St. Albans, England, the two companies came up with a nylon coating on the neoprene that was thicker and softer because of a special weaving process. If you look at a sample under a magnifying glass, you'll notice the nylon appears to be compacted tiny curls.

There are a couple of distinct advantages to this new St. Albans weave. The extra curly thickness works as an inhibitor to water circulation inside a wet

suit. Water gets trapped and won't flow as freely between the diver's skin and suit, as it will with standard nylon covered neoprene suits. And the longer the water is trapped by this spongy nylon against the skin, the longer this warmed up water will keep the diver warm. This new design has a low absorption rate. Water absorption is held to within 1½ to 2%. Excessive water absorption reduces insulating qualities of neoprene.

In addition to the suit being softer and more flexible, the new rubber is also available in brilliant colors of red, green, and blue as well as black.

It also comes in white and a pastel yellow. All seams are glued and stitched. Some seams, depending on where they are located in the suit, are beveled to provide a greater surface area, which increases the strength. Bayley uses three types of stitches, again depending on which seams require a certain stitch. The seams are then overlapped inside and out with one of 15 different color stripings that you can choose from.

When ordering BayleySuit's top of the line suit — the Eureka — if you like, you could have all 24 panels that are used in making the suit, made up of color combinations of your choice at no extra charge. You can walk out of the dive shop looking like a stained glass window. Cosmetically, BayleySuit is one of the leaders in the industry. Having been founded in 1955, they've had years to perfect their designs, color coordinations, and fabrication qualities.

Because a wet suit provides an insulating barrier between the diver and the water, it has to fit perfectly. If it fits sloppily, or if it's too thin, then the suit is not going to be effective. Besides using the right thickness of rubber for the area you will be diving in, fit is very important! Carl Rector, owner and president of BayleySuit, Inc., feels so strongly about proper fit that in 1969, the company installed a computer which allows Bayley to program 21 years of experience into each custom made BayleySuit.

Carl feels that the most effective fit in a wet suit for a diver is that it fits in the position where it will be most effective — the swimming position. If you hold a pair of BayleySuit pants up, you'll note that the legs are bent slightly at the knees — the position a diver assumes underwater, not only when he's swimming, but also when he is crouching underwater on something, or especially when kneeling. Simply put, this is the way a suit should fit a diver when is is submerged and his body is supported by water. To do this properly, a dive suit should be custom tailored for the individual.

BayleySuit models range in cost from \$60 to \$600 to cover all pocketbooks and range of affordability. However, if you're really serious about the sport, Carl emphasizes how important it is to spend a little more money and opt for a custom suit. And for added comfort, you won't go wrong having a BayleySuit made out of the new "Plush" neoprene.

BayleySuit also makes a great Bayley-Buddy as well — a gear bag that is made specifically for carrying the suit and just about all the rest of your gear, too. The bag comes in various sizes and retails between \$36.70 and \$51.70. For more information, check with your nearest pro dive store, or write to BayleySuit, Inc., 900 S. Fortuna Blvd., Fortuna, Ca. 95540. 🐬

AGA/Divator SPM-1 Full Face Mask

By Nancy Ackerman

The Divator Full Face Mask was originally designed for use in fire fighting situations and toxic gas environments. Built and distributed by AGA, a long established, reputable Swedish firm that has been manufacturing breathing apparatus for medical and commercial usage for many years, the mask has now been used commercially for diving in northern Europe for about four years. It has been utilized in deep diving systems, submersibles and undersea habitats and has been successfully tested to 1050 feet in a wet chamber.

For the diver who has a special need, the AGA Divator Mask can prove an invaluable tool. A good example is the marine biologist who must dive in waters adjacent to the sewer discharge pipes to collect water samples for coliform bacteria count. Full face mask protection from germ laden waters is essential and, because of the constant positive pressure maintained on the mask skirt, the AGA Mask creates an effective seal.

Then there is the underwater cinematographer who wants to communicate with his topside crew on the boat. When articulate speech is important, only a full face mask like the AGA Divator Mask can allow the freedom of the lips and tongue for proper formation of words and syllables.

And how about the underwater scientist or inspector who wants to record his observations on a minute-by-minute basis? A full face mask, coupled with a scuba unit and an underwater tape recorder; would provide the ideal setup for mobility and on-the-spot documentation.

A unique aspect of the AGA Divator Full Face Mask is the air flow channel on inhalation from its defroster ports. These ports, situated in the front of the mask, blow dry air from the tank or tanks across the faceplate and into the non-return valves to the diver (see diagram of mask). This unique air flow design prevents the mask from fogging, an annoying phenomenon long associated with most full face masks. Working much the

same as the defroster in a car, the defroster ports certainly do the job! Upon first putting the mask on, the faceplate fogs immediately. As soon as the safety pressure is turned on and the breathing process begins, the condensation disappears like magic. During any of my dives with this mask, fogging has not once posed a problem.

The faceplate of the mask, designed for wide-angle vision, has three viewing planes. While this does allow the mask to offer good peripheral vision, the 90° angle at the jointure of the planes does create some distortion. Some divers seem to be able to adjust to this "aquarium effect," while others are very annoyed with it. It has been suggested that the side panels be etched with a light sandpaper or perhaps even covered with tape or paint. Black tape or paint on the side panels would give the diver the feeling of having tunnel vision with the mask; a white or translucent finish on the side panels would not cause this problem and would alleviate distortion.

The spider-like head harness has five straps which, when worn, emanate from the back of the head and are affixed to the mask by five, stainless steel quick release buckles. Adjustment to these straps is made by pulling back on the straps, removal by pulling each strap forward.

The mask's safety pressure not only precludes leakage into the mask, it also makes the AGA Divator Full Face Mask self purging. Consequently, in the event the mask must be put back on underwater, the mask automatically purges itself when the safety pressure is turned on. The overpressurization setting is turned on manually by rotating the safety pressure valve cover on the breathing valve counterclockwise.

Of all the full face masks on the market today, the AGA Divator SPM-1 Mask appears to be the best suited for use with scuba. Although it is primarily designed for use with the Divator 324 scuba unit, modifications can be made for the mask to be utilized with another first stage reg-



photograph by PPC staff photographer Pat Brolhier

The AGA Mask can prove an invaluable tool for both the sport diver or the professional. It is a high quality mask that is both comfortable and lightweight.



photograph by Paul Tzimoulis

ulator or hookah, provided there is sufficient air flow capacity (about 11 cubic feet/minute) and a secondary pressure range from 90 to 125 psi. The special hoses with appropriate fittings for this modification are available from AGA Corporation. It is equipped with its own highly sensitive, balanced second stage.

Another important feature of the AGA Mask is the soft, natural rubber skirt that allows maximum comfort even for divers with full beards. The oro-nasal cup inside the full face mask, designed for the elimination of "dead space" within the mask, is also made of this rubber. The inner mask has a very low volume area and reduces the dead space by cutting down on the exhaled CO₂ mixing with inhalation air.

An additional feature that the AGA Divator Full Face Mask offers is its easy

adaptability for any underwater communications device. SKIN DIVER ran a test using the mask with an underwater communications system and found the AGA Mask ideal for this use. There is a removable, O ring sealed cover plate for installation of a microphone under the mask's faceplate.

The mask also has a built-in receptacle for wire frame eyeglasses. This feature provides an easy solution for those divers who require corrected vision.

The SPM-1 Mask is a sensitive breathing apparatus, and should not be thrown around the dive boat deck or haphazardly jammed into a dive gear bag. The faceplate is a soft plastic and can be easily scratched.

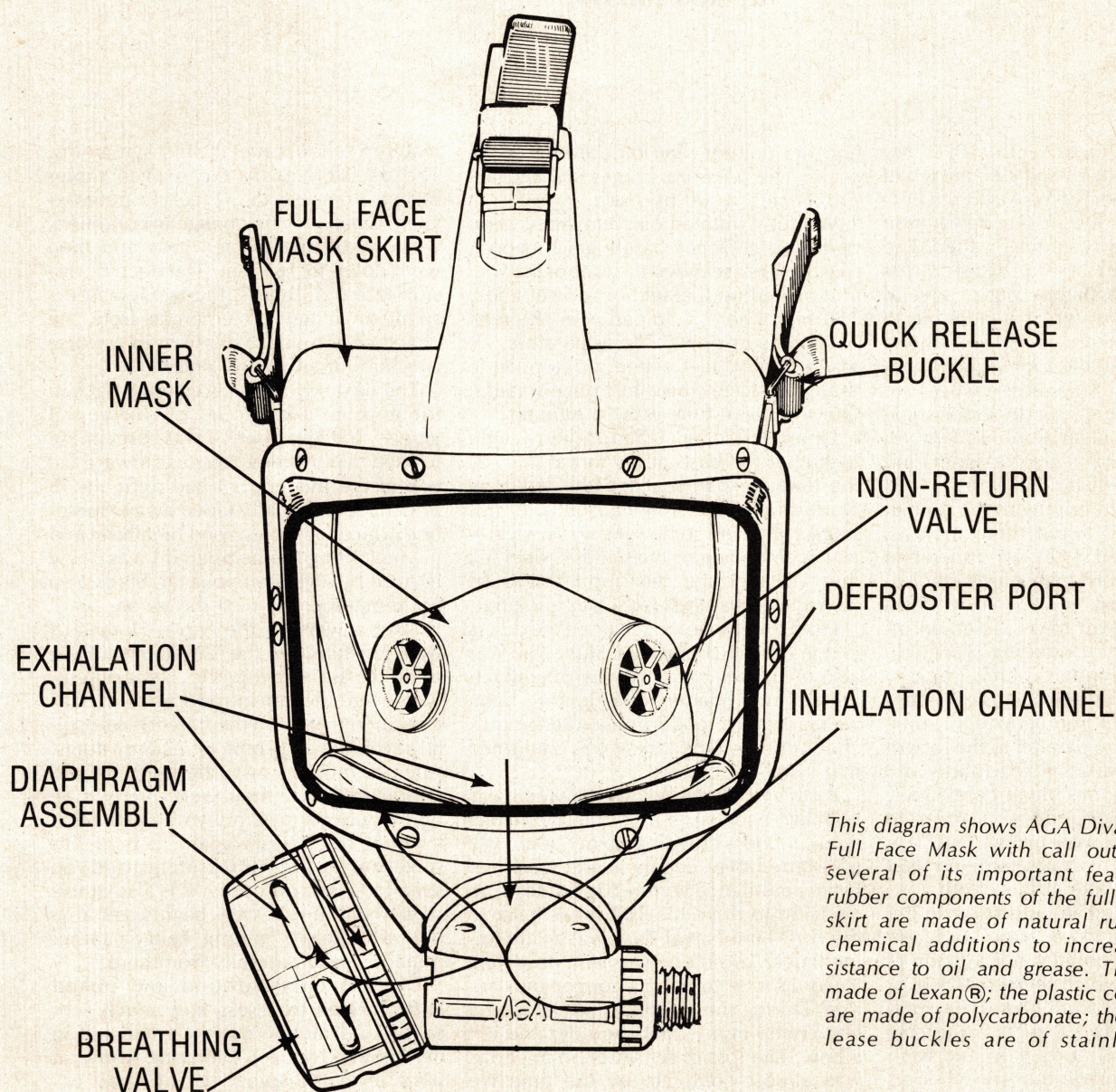
Remember, too, that full face mask diving is much different from conventional scuba diving. It takes time, training and

practice before one becomes totally relaxed and comfortable. Initial dives with any full face mask should be made in a pool or in shallow, calm water.

The AGA SPM-1 Mask retails for \$235, complete with the second stage. The complete Divator scuba unit consisting of regulator, tanks, and full face mask sells for a total of \$695. Admittedly, this gear is expensive, but it is top quality. It's a little bit like buying an expensive automobile — a Mercedes or a Rolls.

The mask expands the capabilities and application of scuba considerably. It provides the serious diver and the professional with a high quality mask which is both comfortable and lightweight.

For more technical information, contact: Gosta Fahlman, AGA Corporation, Divator Division, 1163 Chess Drive, Suite G, Foster City, Calif. 94404.



This diagram shows AGA Divator SPM-1 Full Face Mask with call outs denoting several of its important features. The rubber components of the full face mask skirt are made of natural rubber with chemical additions to increase its resistance to oil and grease. The visor is made of Lexan®; the plastic components are made of polycarbonate; the quick release buckles are of stainless steel.

The Long Road Back

A personal account of the agonizing recovery of a bends' victim

By Ron Johnson



The date was August 26th, 1972. My wife, my friend Nigel, and I left the wharf with other members of the Auckland Diving Club about 8:30 a.m. Our destination was two impressive rocks called The Pinnacles. They are several miles offshore and rise sheerly out of several hundred feet of water. It is possible to find depths in excess of 200 feet only a boat's length from the rocks. The Pinnacles and the Poor Knights as a whole are New Zealand's great underwater show ground — good clear waters, plenty of fish life, black coral at greater depths and good all around dive conditions.

I was just over a bout with the flu that had hung on for about three months. Later, due to blood tests it was found that I had an extremely high blood cholesterol level and high blood pressure. Physically I would never have passed an insurance medical. (How long since you have had a good medical check up?)

Nigel and I started a slow descent down a deep wall hoping to sight some grouper. We swam parallel to the face of the reef and then descended to about 180 feet to look at some black coral trees. There were several opportunities to shoot kingfish that were up to about 60 or 70 pounds, but I was not tempted as it was Nigel's first time at this depth.

I was sure I had the situation under control and checked Nigel out. He seemed fine so I pointed out a patch of pure white sand which seemed 40 feet or so beneath us. We both had about 1500 psi left in our steel 71.2 cu. ft. cylinders.

We hit the sand fairly hard and each breath we took made our air cylinders ring. I did a double take at my depth gauge — it showed 255 feet! I glanced at Nigel's — his gauge only went to 250 feet

and the pointer read off the end of the scale. The pressure gauges showed approximately 1000 psi each.

We fully inflated our buoyancy compensators and they barely gave us positive lift. We ascended the face of the wall and picked up the anchor rope at about 150 feet where it draped over the reef. Ascending as slow a rate as possible, we made it to 10 feet where we stopped to drain the last few breaths from our tanks. Our total dive time was 18 minutes.

Upon surfacing, I had rather a tight feeling at the base of my throat and, by the time we had reached the boarding platform, I was feeling nauseous. At this stage, I was sure something was wrong — was it embolism or the bends? Nigel felt fine. We shed our gear and I had to get my jacket off as I felt like I was choking.

I told the skipper to recall all the divers and to try and contact Dr. Slark who was also diving the area. By way of contacting a charter boat near the doctor's boat, we managed a rendezvous. After a quick check over by Dr. Slark, it was confirmed that I had the bends.

By this time I needed no convincing as both legs had lost feeling, and I could feel the numbness creeping up my body. We transferred to a speedboat and were met by an ambulance within 30 minutes. The decision to drive the 100 miles back to the Auckland Naval Base was made immediately, as no one was sure how long it would take to get a chopper into action. During the trip back I developed a bad cramp in my right shoulder and left elbow. The loss of sensation in my arms was almost complete by the time we reached the Naval Base.

A series of X rays, blood tests, etc., and into the chamber we went approxi-

mately 5½ hours after the first symptoms. The decision to try the oxygen tables meant a descent to 50 feet on pure oxygen. Observing no change in condition, we took off the oxygen gear and then went down to 165 feet. The decompression lasted 43 hours, the last few hours spent on oxygen. I emerged from the chamber very tired, possibly in a worse condition than when I entered.

The next day I was asked to go back in for another five hours on oxygen. I agreed, but apparently I was susceptible to oxygen poisoning, because toward the end of the five hours I had difficulty in breathing and finally faded away. Someone noticed I had stopped breathing and the next thing I remembered I was being revived by a very anxious Dr. Slark. I do not remember the next day or so.

After a week at the Naval Hospital I was transferred to the Middlemore Hospital to the Orthopedic Department, where a gentleman introduced himself as a senior member on the staff of the hospital saying he had come to read my notes. After 20 minutes or so he stood up and announced that they were pretty sure they would get my arms working, but that I would never walk again. It is at this stage that the press loses interest and you soon fade into obscurity. It is also at this stage that the real story begins. Let anyone who thinks getting bent is rather romantic read carefully from here.

Doctors came around and poked and prodded to assess how much sensation and motive powers I had left in my limbs. This let everyone know at what level the spinal damage had occurred. In my case, a massive nitrogen bubble probably formed in my spinal cord at about the lower ribs. The

expanding nitrogen bubble acted like a tourniquet in reverse by expanding within the spine and starving the nerves to the lower body of blood thus killing them (the damage being similar to a broken back with the exception that nothing was actually cut through).

My condition at this stage was that of a quadraplegic. I could use my left arm a little and, if someone put a fork in my hand, I could get the odd morsel of food into my mouth. Most of it would miss the mouth and end up anywhere in the general vicinity of my head.

Now eating and drinking were essential to life — but what went in had to come out. This was the most humiliating part because the paralysis also affected all the muscles that controlled the bladder and bowels and there was nothing I could do to control these functions.

The bladder was a relatively simple inconvenience as they inserted a tube into the bladder and it drained away continuously. This meant I was very susceptible to infections of the urinary tract, so I had to consume large quantities of liquid to continually flush through my system. In my case it meant drinking 10 quarts of fluid a day. After a while, I was prescribed three quarts of beer per day and that was a pleasant change. As for the control of the bowels, there was nothing to be done about it. Accidents happened and I had to live with it.

Remember, too, that I was completely paralyzed — I could not sit up, roll over, adjust my pillow or anything without asking for assistance. Quite often one of the other patients would tell me that one of my legs was hanging off the bed. Because I was unable to move myself, I had to be rolled into a new position every two hours both day and night.

After two weeks of lying in bed, blood clots had formed in my legs due to poor circulation. One night I woke up with severe chest pains, gasping for breath because the clots had shifted and clogged my lungs. I was rushed into critical care and was put on a blood thinning intravenous drip and oxygen for two weeks. It is true, you can't recall pain, but I know I would never want to go through that stage again.

After returning to the regular hospital ward, I met Pat Davis, a physiotherapist to whom I owe very much. She immediately dismissed the verdict about my not walking again and got me working. She would spend a couple of hours a day just exercising my legs and arms.

Slowly, after weeks of bed exercising I could move my legs and arms a little. The left arm in particular had regained quite a lot of strength. The sensation of sharp or blunt, hot or cold, was still nonexistent in my lower body, but my arms were im-

proving slowly. Then, with Pat's help, I was able to sit on the edge of the bed and with her support I learned to stay upright by watching things that were upright (door frames, etc.) as I had no sensation of falling until past the point of no return. Slowly, over a period of days and weeks, my muscles began to respond.

Finally came the day when I could sit upright, unaided. It was now time to start work in the gym. Pat and another therapist decided they would teach me to crawl. They put down two mats with a mirror at the far end. Between them, they propped me up on my hands and knees and while one took my body weight, the other would move one hand forward, then move the opposite leg. This way we covered the length of the mat — at least 12 feet. When we finished, I was exhausted and had to go back to bed to sleep it off. After two to three weeks I could cover the distance by myself. By watching myself in the mirror, I could tell if I was falling and make corrections. I would tire and fall often, but Pat was always there to bully me on.

Next, they made for me heavy plaster casts that covered the backs of my legs from the heels to upper thighs. These would be strapped tightly to my legs and I would be wheeled up to a set of parallel bars, once again with the mirror at the far end. Eventually I could walk the length of the parallel bars both ways unaided.

Then we had to start the same exercises again, only this time without the casts holding my legs. It was like trying to stand on two pieces of soggy spaghetti. From here we went to crutches and I could soon shuffle the length of the ward corridors. Interestingly enough, I later met the same doctor who claimed I would never walk again. He said he would have still given the same diagnosis.

I soon started going to a rehabilitation center every day. There, with occupational therapy such as woodwork, metalwork, mat weaving and pottery, I regained all my arm strength. But I was plagued with a very sore back, which only grew worse as I tried to improve it with physical exercise.

After 114 days in the hospital I was released. I bought an automatic car and managed to pass my driving examination. I returned to my old job as the manager of a pro dive store where I managed to shuffle around holding onto counters for support, occasionally collapsing out of sight while talking to a customer. It was very embarrassing having to ask one of them to come around and help you up. The work left me completely exhausted at the end of the day and by the end of the week the back pain made me feel like I was looking through a red haze.

I always had a change of clothes with

me because I still had a little problem with my bladder control. Several times while at the work bench or even waiting on a customer, the sound of running water could be heard and I would have to go off and change clothes. Most people were understanding.

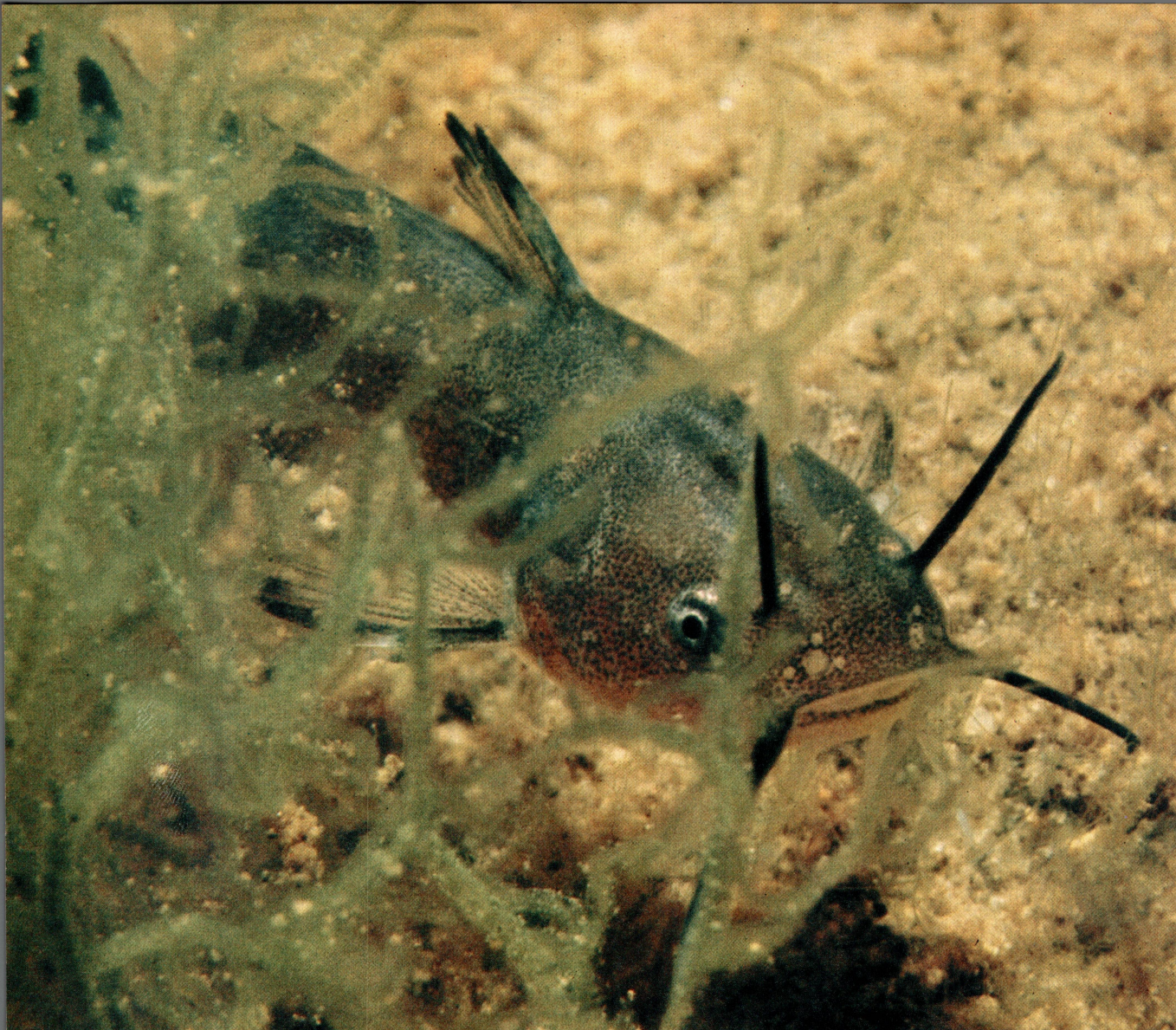
Uppermost in the minds of most divers I meet, be they old friends or new chums to the sport, is: if you are paralyzed from the mid-body down, how does it affect your sex life? I try to relate as much to them as I feel is necessary. I think it is something that hits home harder to a lot of divers just what they may be losing if they continue to ignore the warnings about deep diving.

Every bends victim's sex life is affected and the amount of recovery is just as varied as the recovery of his other affected areas. At first my sex life was completely nil. Then with the increased return of motor power and sensation, one's interest in sex begins to take on more importance. It is an interrelated matter of trying to coordinate the body and the mind. Every paralyzed person who suffers the loss of the important bodily functions finds their sex life is one of the slowest functions to return to normal.

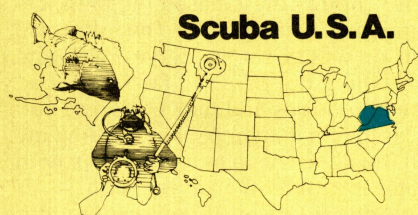
My time out of the hospital lasted about 14 months, when because of stiffness in my legs, I caught my heel coming down the stairs at work and fell head over heels down about 20 stairs. Panic! I could not move my legs and my back was on fire. The first fear was that I had broken my back this time. After X rays and examinations by neurologists, it was decided I had done massive damage to my spinal nerves again. One thing was sure — it was a lot worse this time.

The decision was made to try a new pain clinic at Auckland Hospital. In my case they injected local anaesthetics and steroid drugs into the sore areas of my spine. Though these eased the pain, the treatment was temporary. The follow-up decision was to cut the nerves that were transmitting the pain. So far I have had three operations and had 14 nerves cut. This is my final attempt at alleviating my pain. I will just have to learn to live with whatever problems I am left with.

So, intrepid diver, if you want to join the ranks of the bent ones, ignore all advice and continue to go deeper and deeper. But take it from me it is not worth it. I have been diving since 1958 — sport diving, commercial diving, a qualified N.Z.U.A. Instructor and about 12 years in the selling of diving gear. I always thought it could never happen to me. Remember: no one is immune to nitrogen narcosis and everyone is "bendable." I am 32 years old and get around as though I am 82. Oh, how I would like to turn the clock back. . .



Shenandoah's Unspoiled Waters



For the diver, there is an escape from the murky water polluted by man in his quest for progress and industrial development. The escape comes with the fresh waters of the mountains of the eastern United States — crystal clear waters, far removed from the water pollution of an urbanized society.

Finding these waters that are still virtually untouched by man doesn't come without its disadvantages, however. Access is sometimes difficult and diving facilities are far from sophisticated. But for that individual who wants to combine the best of both outdoor worlds — camping and hiking along with diving — there is no better place.

Probably one of the best locations in the East is Virginia's Shenandoah Valley — where the Blue Ridge and Allegheny Mountains (both part of the Appalachian Mountain chain) flank a rich valley with the famed Shenandoah River flowing down the center.

Ironically, diving in this area didn't become popular until that enemy of pure waters, urbanization, began creeping into the quiet, serene valley. Interstate highways cut through the valley and with them came the giant rock quarries which were dug and left abandoned. With the quarries, and their 50 to 100 foot spring fed water depth, came a growing interest in diving.

As the quarries came, interest in diving began to grow in the valley and then spread to other sites, first to the conservation flood control dams and then to the

By
Tommy Thompson and Fred Hilton

A mirrored reflection in the surface of the water shows a painted turtle as he stretches his neck for a breath of fresh air.



photography by Tommy Thompson

best of all possible locations — the mountain streams and ponds far back in the hills and ravines of the Shenandoah Valley.

Here, mostly in the lands of the George Washington National Forest, begin the tiny glass clear streams that eventually become the mighty rivers that roar into the Atlantic Ocean and Ohio River.

Access to the general area is simple enough. You'll want to make your base of operations one of three small cities (17,000-25,000 population) in the central Shenandoah Valley — Harrisonburg, Staunton or Waynesboro. They're within a one half hour radius of one another and all are on one of the interstate highways.

Two major interstate highways —



81 and 64 — come directly into the area. If you're traveling from the north or south, Interstate 81 brings you straight to Harrisonburg and Staunton. It's about a two hour drive from Washington, D.C. and a little less than two hours from Roanoke, Va. to the south.

If you're coming from the east, Interstate 64 goes through Waynesboro and connects with Interstate 81 near Staunton. Staunton is about two hours from Richmond, Va.

Arriving from the west isn't quite so simple. The arrival route is U.S. 33 which cuts through the mountains of West Virginia and Virginia to reach Harrisonburg. U.S. 33 isn't an interstate highway and the going is a little slower but the almost heaven scenery of West Virginia makes the trip well worth the while.

As you'd expect with towns on the interstate highways, there would be no problem with motel accommodations. Motels from virtually every national chain are situated on the highways near the three cities of the Shenandoah Valley. Rates are

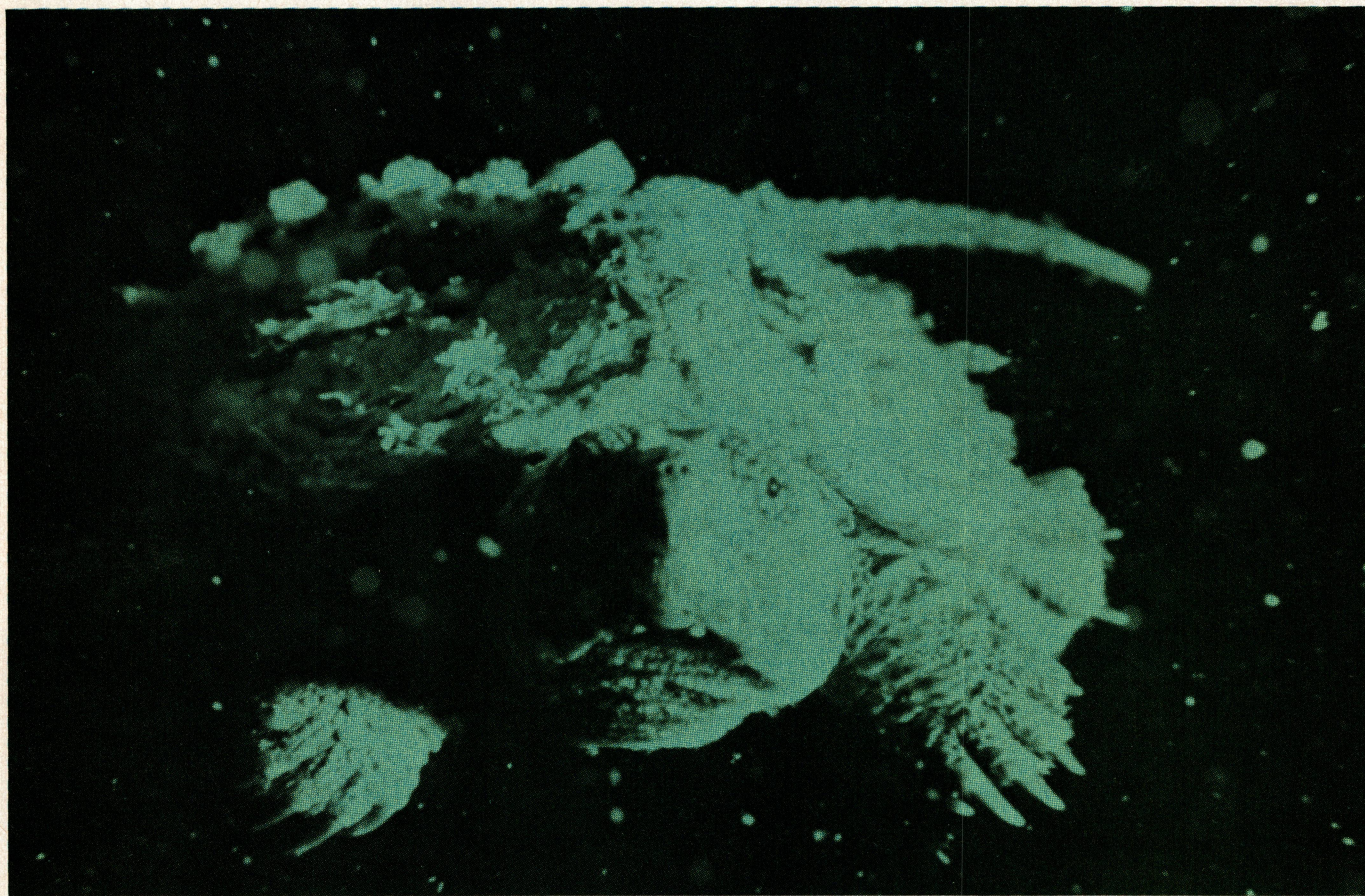
quarry is stocked with freshwater fish — trout, carp, bass and channel cat. And, to make things even more interesting, the quarry also has a number of old cars and buses at the bottom.

The bottom is made up of patches of rock, silt, grass and gravel with visibility ranging from 20 to 30 feet in the summer and 55 feet in the winter. Dive lines are placed throughout the lake to make negotiating easier.

Air is available at the quarry. This, however, is one of the few places in the area where you can conveniently fill your tanks so it would be best to fill them before you leave home or to make some inquiries beforehand to find some other locations for getting air.

Here, as at all the places in the area, be prepared for cold water. Water temperatures, lowered by the cool mountain streams, range from 50 to 60 degrees even in the hottest months of summer.

Spearfishing is not allowed at Haymarket Quarry, neither is



Diving the virtually untouched waters of Virginia's Shenandoah Valley is a pleasant escape from the industrial world. Leisurly swimming along the bottom of one of the many lakes found in the valley is a primitive looking snapping turtle.

reasonable and there shouldn't be any problem in getting a room, although it would be wise to telephone ahead for reservations during the summer. In addition, there are many campsites throughout the valley, including a large number right at the dive sites.

The first dive site worth checking into is at Haymarket Quarry, only about an hour from Washington and three miles east of the town of Haymarket. This is not actually in the Shenandoah Valley but is certainly an outstanding dive location.

Depths range from 10 to 100 feet with good visibility and easy entry from the beach at most points in the quarry. The

it allowed at any other sites in Virginia. State law prohibits any type of spearfishing in Virginia.

About an hour south of Haymarket, you enter the Shenandoah Valley itself. The first good place to consider a dive is Sherando Lake, the largest recreation development in the George Washington National Forest.

Sherando is reached by taking the Greenville exit from Interstate 81 and then following U.S. 11-340 to Route 664. Swimming, boating, and hiking are available at Sherando and there are outdoor recreation and education programs led by forest naturalists, as well as campfire theater programs. Tent

sites and trailer sites are there, along with picnic and toilet facilities are available.

The diving area runs about 30 feet in depth with visibility ranging from 10 to 30 feet. Warm water fish — bass, trout, pike and brim are in abundance.

Not too far from Sherando is Todd Lake, an attractive recreation development near the North River. To reach Todd Lake, get on Route 42 to Bridgewater and then get on Route 727. From there go to Route 730 and follow the direction signs.

Todd Lake has a swimming beach, a playfield, coldwater showers, a picnic area and tent and trailer camp sites. In addition to the lake, outstanding dive opportunities are available at a number of mountain streams. The depths of the streams, which contain all types of warm water fish, range from 12 to 15 feet. The best way to find the good streams is to check with some of the forest rangers.

These streams are actually where the mighty Potomac River originates. The streams combine to form the Shenandoah River which then flows northward (unlike nearly all American rivers) into the Potomac.

In nearby West Virginia, but still in the George Washington National Forest, is another good spot for diving. It's named, appropriately, Trout Pond and it is abundant with trout.

Trout Pond is the newest recreational development in the area and contains West Virginia's only large natural lake but unfortunately this lake is restricted and diving isn't allowed. However, there's also a large man-made lake with depths of 30 feet and up that's fine for the diver.

At Trout Pond, there are hiking trails around the lake and horse rentals are available. The area also includes tent and trailer camp sites.

To reach Trout Pond, you take Route 42 to the town of Broadway and turn on Route 259 until you reach the small town of Lost River. Signs will then direct you to Trout Pond.

One other location in the central Shenandoah Valley is quite worthwhile for the diver. That's the area of Dry River and the small mountain streams that run into it. Dry River runs west of Harrisonburg, in the mountainous areas just on the Virginia side of the Virginia-West Virginia line.

The stream is very shallow, rarely exceeding 10 or 12 feet in depth. It's ideal for the diver who wants to get a good, close-up look at the amazing variety of marine life that flourishes in the twisting, clear streams of the mountains. You can see everything in Dry River from the tiny johnny darter up to 30 pound channel cats and carp. You might occasionally even run into a pike or muskie.

A note of interest is that Dry River is in the heart of the Shenandoah Valley's Mennonite country. The Old Order Mennonites, a religious sect similar to the Amish of Pennsylvania, still live the life of 19th Century America and make no use of man's modern technology. Throughout the Shenandoah Valley, you'll see the Mennonites wearing their black clothing and riding in horse drawn carriages — just like their fathers and grandfathers did.

The entire Shenandoah Valley abounds in tourist attractions to whet the interests of any visitor to the area. Among the places the diver might want to visit when he wants to take a break from the waters are:

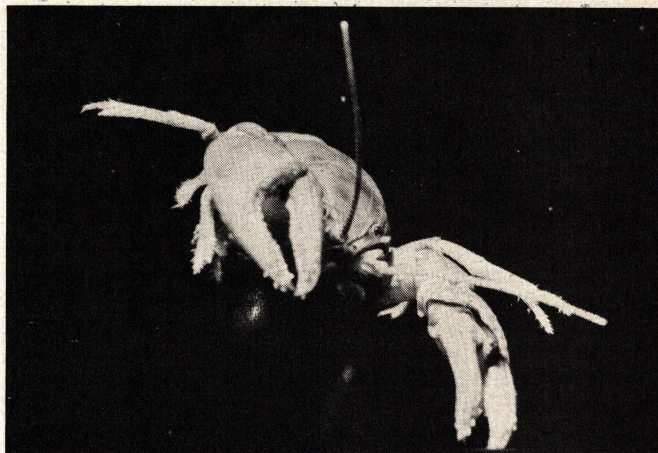
The Skyline Drive. The beautiful Skyline Drive is nestled in Shenandoah National Park and winds safely and gently along the crest of the Blue Ridge Mountains for 105 miles providing 75 scenic overlooks. There are many points to enter Skyline Drive in the Staunton-Waynesboro-Harrisonburg area.

New Market Battlefield. A legend of teenage courage was created on this 160 acre park site by 247 Virginia Military Institute cadets who fought — many of them dying — in this 1864 Civil War battle. Their story is told in the park's new

million dollar museum, the Hall of Valor. Admission to the museum is \$1 for adults and 50¢ for children. New Market is just north of Harrisonburg on Interstate 81.

Many natural caverns. Among the many caverns in the valley are Luray Caverns, the largest and most popular cave in the eastern United States and famous for variety, profusion of formation and range of natural color. The caverns contain the famous Great Stalacpipe Organ which plays music of concert quality on stone formations. Luray Caverns is on U.S. 211, just minutes from Interstate 81 near New Market. Admission to Luray Caverns is \$3 for adults and \$1.50 for children.

Natural Chimneys Regional Park. This park, in Mt. Solon, Va. and near Todd Lake, contains seven towering "chimneys" that have been described as one of the greatest curiosities of nature in the eastern United States. These gigantic limestone columns rise to a height of 120 feet. The park is also the site of an annual jousting tournament for horseback riders. The tour-



Because of the great visibility, the author was able to take these unusually clear black and white photos of a school of rock bass cruising along the bottom and a crayfish peeking from a crevice.

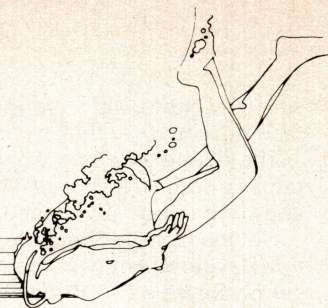
namment, held on the third Saturday in August, began in 1821 and is reputed as the oldest continuously held sporting event in America today.

All in all, a visit to the Shenandoah Valley can provide the outdoorsman with rich dive opportunities as well as a chance for exciting outdoor life in a beautiful and historic area. The trip can be relatively inexpensive. Motel prices and meals in the area are reasonable and camping fees in the George Washington National Forest range from \$2 to \$4 per night. The only problem might be in locating air for your tanks. Since the area is not built up with marinas, there are very few commer-

(Continued on Page 96)



News Briefs



By Hillary Hauser

NEW CORALS

Twelve new species of coral have been found off Ishigaki Island of the Yaeyama Island group south of Guam. The corals were found by Shohei Shirai, president of the Pacific Resources Development Research Institution, who altogether collected 220 species to find the twelve.

PORPOISE VICTORY

Good news for porpoises! On May 31, a U.S. District Court judge in Washington, D.C. ordered a ban on the purse seining technique used by tuna boats known as fishing on porpoises. The technique, says environmentalists, kills more than 100,000 porpoises a year. The mammals swim with schools of yellowfin tuna (no one knows exactly why) and the boats can zero in on tuna schools by following the porpoises. They are scooped into huge purse seine nets, along with the tuna, and while the fishermen do their best to return them to the sea, the mammals often become ensnared in the nets and drown. The American Tuna-boat Assn. in San Diego says the ruling is disastrous for the industry and will mean that many boat owners would have to sell out or transfer to foreign flag operations. Judge Charles R. Richey, who handed down the ruling, stated that protection and conservation of the environment "must, almost inevitably, impose temporary hardships on those commercial interests which have long benefited by exploiting that environment." The suit for the porpoise was filed last year by the Fund for Animals, Inc. (140 W. 57th St., N.Y., N.Y. 10019) and is considered by the group to be a major victory.

HOLLYWOOD GOES UNDER

The sea and its inhabitants are becoming more and more popular as subjects for films being made by major Hollywood studios. Presumably this has been brought on by the all time high success of *Jaws*, (which, incidentally, has netted author Benchley \$5 million for his share in the picture's profits). Now, Benchley has come up with another watery book, called *The Deep*, published in May by Doubleday. It's about a honeymooning couple on a diving holiday in Bermuda that manages to run into a sunken cache of drugs and booty for the expected result of high seas drama. *The Deep* had already reached the number one position on the best seller list in London by June, and the motion picture version went into production in July. It is being produced by Peter Guber Filmworks Productions for Columbia Pictures and is starring Robert Shaw and Nick Nolte. Underwater direction is by Al Giddings, with underwater lensing by Giddings and Stan Waterman; David Doubilet is shooting publicity stills, Peter Lake (still photographer on *Blue Water - White Death*) is assistant to producer.

Other sea going film projects are also in the works. Dino De Laurentiis has picked Newfoundland as his setting for his upcoming scarifier, *Killer Whale*. Newfoundland has also been chosen for *Whale for the Killing*, a film based on Farley Mowat's true story of his attempt to save a stranded fin whale from gun happy natives. (Producers are Bob Lovenheim and Mitch Brower, who had planned to start shooting last month.) Another film taking shape is *Greenpeace*, to be produced next year for Artists Entertainment Complex and based on the true story of the conservation group by the same name that puts itself between Soviet and Japanese whaling ships and the whales. The screenplay is now being written by Jack Richardson.

But still there seems to be nothing like the real *Jaws*, the biggest money making film in history. Producers Richard Zanuck and David Brown are already at work on *Jaws II*, a sequel to the original. Roy Scheider has been cast for the second production, which will be shot next spring in Martha's Vineyard.

Meanwhile, Peter Benchley, who is considered by many to be responsible for this upsurging interest in the sea, can be seen in a cameo role as a television newscaster in a film called *Grizzly*. The monster is, of course, a marauding bear rather than a shark. Reviewers, who have dubbed the film "Claws," say that the sympathy goes to the bear rather than the people, and feel it is only one of a number of planned *Jaws* imitations. We've already heard of a few others: There is one about marauding crocodiles, another about swarms of deadly bees, another very imaginative one about a driverless car that terrorizes a small town, and for the grand finale — a plague of earthworms? That one is called *Squirm*.

OCEANIC RX

Medical help from the sea is a subject that is frequently in the news. Several research projects along these lines that we've heard about recently include one in which marine animals are being investigated for anti-cancer drugs. Scientists at Arizona State U. are looking at mollusks retrieved from 600 ft. in the China Sea. The bivalve seems to be a potent anti-cancer agent, but "conclusive work still remains to be done." Elsewhere, an MIT scientist is looking at chitosan as a material to make bandages and artificial skin. Chitosan is the stuff found in chitin, from crab or lobster shells. Prof. B. L. Averbach has made a film from chitosan which appears to promote the healing of wounds. Another research project is examining corals, sea whips, seafans, anemones and two species of sponges. Under a \$90,000 grant from NOAA, U. of Oklahoma Sea Grant scientists are finding the above species to be the most promising sources of chemicals for the treatment of cancer and heart disease.

KILLER REPRIEVE?

Another ocean mammal may be getting a reprieve, too. Legislation to ban the capture of killer whales was sponsored last May in the state of Washington by Rep. Bonker (D-Wash.) and Sen. Warren Magnuson (D-Wash.). Three southern California congressmen have opposed the legislation, saying it could put commercial marine parks such as San Diego's Sea World, out of business. The three: Democrat Lionel Van Deerlin and Republicans Bob Wilson and Clair W. Burgener.

ATOMIC LEAKS

A federal scientist has reported the discovery of traces of plutonium and cesium contaminating the ocean floor off the U.S. According to a news report in the International Herald Tribune (Paris), the radioactive materials appear to have leaked from thousands of 55 gallon drums of low level radioactive wastes dumped into the ocean about 120 miles east of the border between Maryland and Delaware and 35 miles west of San Francisco. A description of the U/W search of the dumping areas and the discovery of the radioactive materials was presented by Robert Dyer, an oceanographer with the EPA, to the Intl. Atomic Energy Agency last March. Dyer made his discoveries while using the manned submersible *Alvin* off the east coast and the unmanned submersible *Curv III* off the west. Dyer said the situation has not yet translated itself into any health hazard, but believed that the questions involved in the practice should be examined.

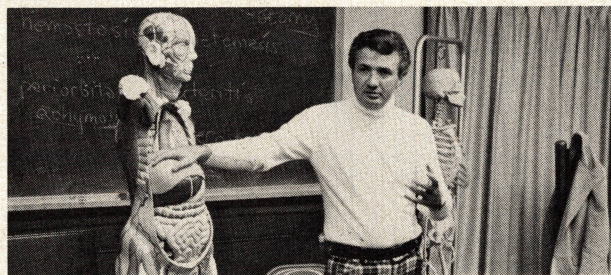
The dumping areas had been licensed by the AEC to receive low level radioactive waste from 1940-1970, though relatively little was dumped there in the last eight years of the period. The Atlantic dump received about 14,300 drums of radioactive materials and the Pacific (near the Farallon Islands) received 47,500 drums. Dyer said core samples taken in mud and sand near intact and broken drums in the Pacific showed "contamination in surface sediments 2-25 times higher than maximum expected concentration that would have resulted from weapons testing fallout." In the Atlantic dump the cesium contamination was 3-70 times higher than the maximum expected fallout concentration. Dyer found that some of the barrels in the Pacific had been crushed by water pressure against trapped air pockets within the containers and that many of the barrels showed signs of corrosion.

HELP FOR PLATFORMS

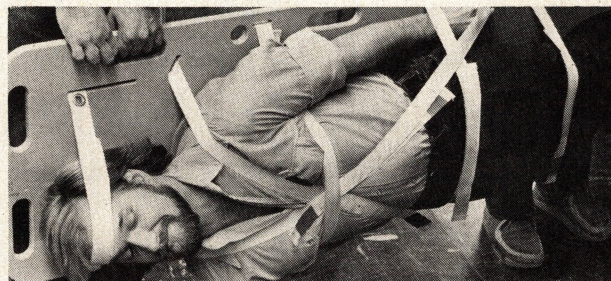
The commercial dive industry is doing a gallop to keep pace with the demand for more divers who can go deeper, longer. The biggest need is the offshore oil industry; there are presently 300 offshore oil platforms and in four years it is estimated there will be 200 more. Many of these platforms are in deeper water (1000 ft. being common) and they are in remote areas.

It is exciting stuff when a major overhaul of technique is made where technology gets a big push forward. Of significance along these lines is a new paramedic training program that is being supported by Oceaneering Intl., Houston, and implemented by Commercial Diving Center, Wilmington, Calif. The idea is that every offshore oil platform in the world will have a diver who is also a trained paramedic. No longer will it be necessary to wait for helicopters from shore with no one knowing what to do in the meantime. Very often the moments lost in waiting are precious, where a diver or worker's condition could be assessed and stabilized.

The paramedic program, now underway at CDC in Wilmington, is training emergency medical technicians (EMT) divers. Working with the USC School of Medicine, CDC formulated and tested a program which has met with success. The two phase training program consists of a five week study period, plus a three week practicum period which includes everything from anatomy to hyperbaric medicine. Director of the program is Dr. Richard S. Scott of the USC School of Medicine; consulting physicians include Dr. David Youngblood, medical director of Oceaneering's worldwide operations, Dr. John Alexander, medical director of CDC and faculty member of the UCLA School of Medicine, and Dr. Helen-Lee Mason, OI medical director for the UK. Jim Joiner, Director of CDC, emphasizes that a medic does not just wait around with his arms folded. He is trained in all diving operations and procedures. He works as a diver tender, rack or chamber operator, or a stand by diver. His medical training is one facet of his multiple expertise.



Dr. Richard Scott, program director, teaching physiology.



Evacuation of injured victim under restricted conditions.

TRIKE NEWS

We've received yet more letters from readers who say the UC San Diego Sea Deucers are not the first to conduct an U/W tricycle race (March '76). Reader Robert Sowley sent in an article published in *Torii*, a U.S. Army-Japan publication, about an U/W trike race held in fall of 1974 by the Zama Ocean Rovers, in Japan. Another reader, Gary Olson, sent a newspaper writeup about his club's tricycle race at Lowell High School in 1973. (We couldn't ascertain where Lowell High School is, but the lesson is that underwater wheeling ain't news.)

1778 SITES

A Maryland based U/W research group has located and done survey work on several Revolutionary War shipwrecks in Mullica River, New Jersey. The group, Nautical Archaeology Associates, Inc., believes the wrecks were sunk during the British naval assault on the American privateer base of Chestnut Neck in 1778. After NAA's discoveries, the sites were researched, investigated and then surveyed by Gordon Watts of the No. Carolina Dept. of Archives and History, Dr. Lorraine Williams, archaeologist with the N.J. State Museum, and Donald Shomette, founder of NAA. It is expected that the Mullica sites be nominated to the Natl. Register of Historical Places.

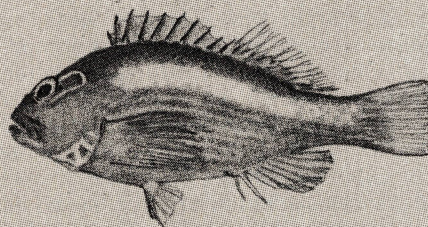
ODDS & ENDS

In May, English adventurer Tim Severin and his crew of four left Dingle Bay, Ireland, in a replica of the leather boat used by St. Brendan, who supposedly discovered the New World... New Zealand has decided to rejoin the International Whaling Commission; it was a member of the IWC between 1950-1968, but dropped out because it felt the group did not have the strength or membership to preserve the species.

The Arc-Eyed Hawkfish

(*Paracirrhites arcatus*)

Hawkfishes are so named because of their habit of perching atop a coral branch, waiting to pounce on unwary prey. In sudden, vulture like dashes, the hawkfish captures small fishes and crustaceans and then returns to its coral outpost. The coral is an important refuge. At the approach of a swimmer the fish will dart into the branches in a hurry and is always very reluctant to leave. There are recorded instances where hawkfishes have stayed with a piece of coral that has been removed from the water, wiggling out on dry land. Because of this characteristic, the Hawaiians have named the hawkfish pilikoa, or coral clinging. □ The arc-eyed hawkfish, *Paracirrhites arcatus*, is an inhabitant of Indo-Pacific reefs. It has been recorded from Celebes, New Guinea, the Indian Ocean, Melanesia, Micronesia and Polynesia, including Hawaii. It is one of the most recognized of the hawkfishes, with its dark patch that extends back from the eye. This patch is normally deep green, bordered with light blue, cardinal red or orange, or white. The presence of this eye patch has given the fish its common name. There is also a large white streak on the back part of the body, but this is apparently not present in some individuals. The ground color of the arc-eyed hawkfish is subject to variation, but is usually olivaceous with thin horizontal stripes of red over the body. The head can be a deep purplish red. Our pictured specimen is very pale, yet the characteristic eye patch, as well as the large white streak, are still obvious.



adult species

This pale rosy coloration has been noticed on other arc-eyed individuals by ichthyologists Jordan and Evermann, who state that neither the color differences or the presence or absence of the white streak seem to have anything to do with age differences. □ *Paracirrhites arcatus* is a member of the small family Cirrhitidae, or the hawkfishes. Para means near in Greek, and the Paracirrhitidae is one of the more common genera, characterized by two notable differences: *Paracirrhites* lacks palatine teeth and has large scales on the cheek. Jordan and Evermann note that most of the Cirrhitidae species of Polynesia belong to the Paracirrhitidae genus. The Cirrhitidae family is believed to be very close to the scorpionfish family (Scorpaenidae) because of their thickened dorsal fin rays. However, hawkfishes lack the head spines of the scorpionfishes. Ichthyologists Bohlke and Chaplin feel there is a possibility that hawkfishes represent the link between the bass like fishes and the scorpaenids. All hawkfishes have strong, thickened pectoral fins, which they use to perch themselves up for a view from their coral lookouts. □ The arc-eyed hawkfish is very common, especially in the Hawaiian Islands. It is a small fish, its maximum length usually under six inches. For the most part it lives in shallow tide pool areas. In Tahiti, children fish for it by throwing handlines into reef crevices that become exposed as waves recede. Here, *P. arcatus* is called Patui, or the striped hand fish. 🐟

Photo By Paul Tzimoulis - Text By Hillary Hauser

Photo taken in 20 feet of water off the Kona Coast in Hawaii. Tzimoulis used a Nikon F camera and a 55mm Micro Nikkor lens in an Oceanic Hydro 35 housing with Ektachrome X film shot at f16 with a strobe flash.



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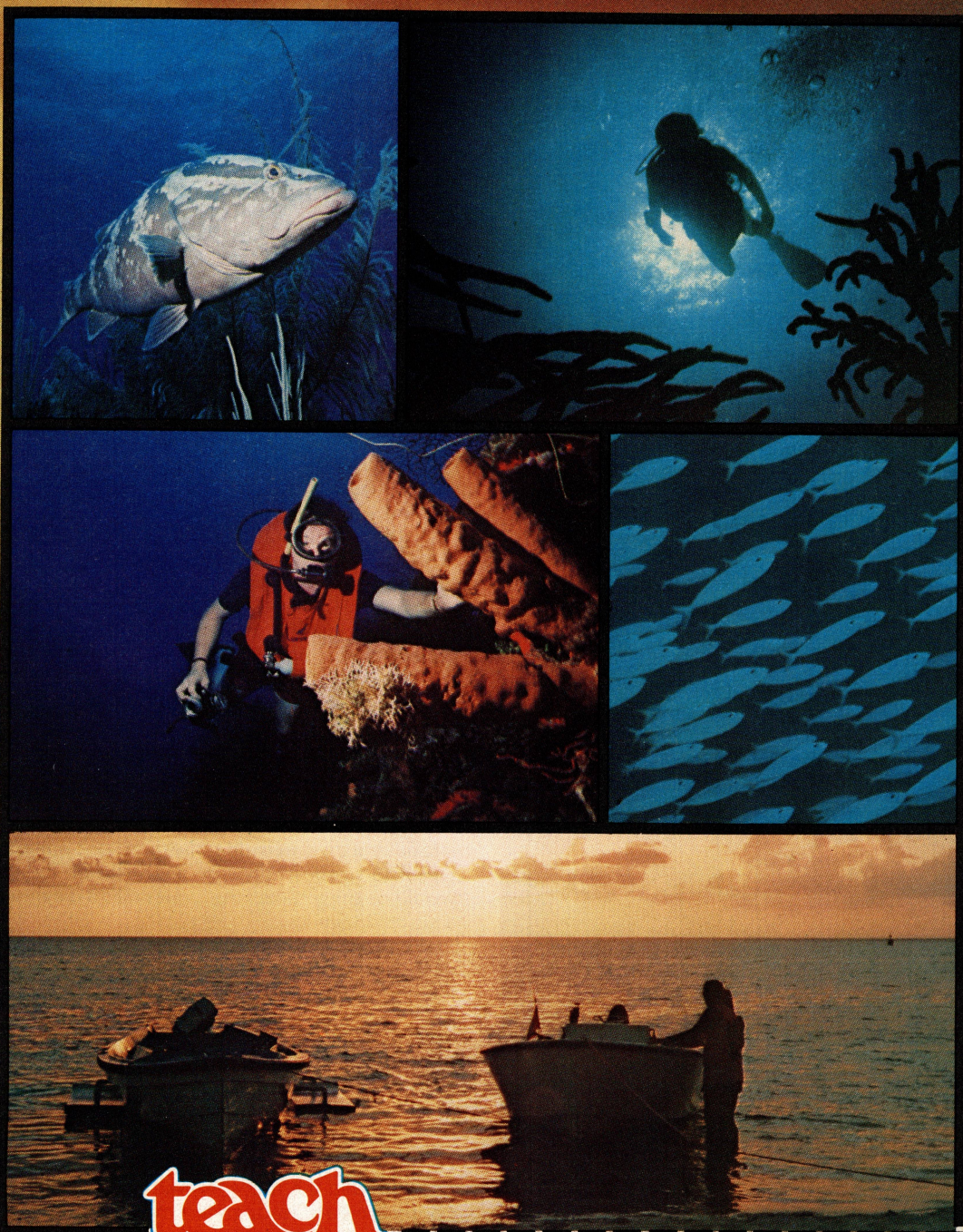
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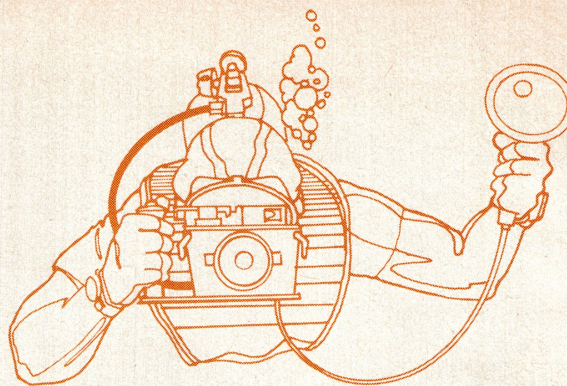
abc's

of underwater photography

CHAPTER 9

NIKONOS WIDE-ANGLE LENSES

By Jim and Cathy Church



The purpose of this article is to present three wide-angle lens systems which can be used with any model Nikonos camera body: the "Green Things" Opal-Eye, Sea-Eye 21mm lens and the Nikon UW-Nikkor 15mm lens.

WHY USE A WIDE-ANGLE LENS

Before describing the hardware, let's begin by examining two reasons for using a wide-angle lens:

1. With large subjects — such as two or more divers in a group — you would have to back off so far with a Nikonos 35mm or 28mm lens that your subjects might be beyond the range of your visibility.

2. Even smaller subjects — such as a diver from the waist up — will be much sharper if you use a wide-angle lens to reduce the camera to subject distance. This is especially true in turbid water where suspended particles reduce picture sharpness.



Our illustration was taken in turbid, California water at less than three feet with a Seacor 21mm lens. Although copied on Tri X from an Ektachrome X slide, this print shows the sharpness gained by moving in close with the wide-angle lens.

However, using a wide-angle lens requires practice. Should part of a diver subject — such as a hand or fin — be extended toward the camera, it will appear to be distorted (too large) in your picture.

THE OPAL-EYE

Getting to the hardware, the Green Things Opal-Eye (distributed by Aqua-Craft) is an optical widener which fits over the standard Nikonos 35mm lens and widens the picture angle to approximately that of a 21mm lens with a dome port. It is hand pressed over the Nikonos lens assembly and is held in place with a nylon set screw.

The major advantages of the Opal-Eye are:

1. Priced at \$195, it is the least expensive of the wide-angle systems discussed in this article.

2. It can be installed or removed easily underwater if you wish to switch from wide-angle to normal-angle or close-up photography during the dive.

While the Opal-Eye is a valuable, low cost accessory for sport photographers, it naturally cannot match the optical quality of the more expensive Seacor and Nikon wide-angle lenses. As for disadvantages, the aperture and focus scales are difficult to read when the Opal-Eye is in place, and (at this writing) there is no viewfinder designed to accompany it. We recommend using the Seacor Sea-Eye IV viewfinder with the Opal-Eye.

The Opal-Eye and Nikonos are shown mounted on an Ikelite Nikonos Tray. The twin flash arms can be used to mount two strobes encased in Ikelite housings, or a pair of Sonic Research SR 2000 strobes, for wide-angle strobe lighting. One strobe would be triggered by the camera, and the other would require a slave sensor.

We placed the Ikelite handle to the left of the camera. You can also place it to the right and trigger the shutter with an Ikelite thumb release.

SEA-EYE 21mm LENS

The Seacor Sea-Eye lens retails for \$595, has a plastic body and a dome port. The Sea-View IV optical viewfinder, priced at \$49.95, is designed especially for use with this lens.

The picture angle is 92° diagonally, 80° horizontally and 60° vertically. The aperture is adjustable for f3.3, f4, f5.6, f8, f11 and f16, and the focus from 2.5 feet to infinity. Both control knobs are easy to operate, and both the aperture and focus scales are easy to read underwater. The optical viewfinder is also easy to use — just hold the rear of the finder flush against your facemask. You can accentuate the picture area by outlining the painted borders on the finder with black tape.

To use filters, simply unscrew the rear lens element (turn to the left by hand) and drop a disc of filter gel (available at camera stores) inside. Replace the rear lens element and the filter is mounted inside the lens system.

The Sea-Eye 21mm lens has several advantages:

1. The plastic body cannot corrode, reduces the weight of the lens and helps reduce the price.

2. Because the plastic Nikonos mount of the lens is softer than the metal camera body, the plastic should absorb any wear, and the plastic mount can be replaced for about \$1.

3. Repair facilities and parts are readily available at Seacor's San Diego, CA, location.

As for disadvantages, the lens does not have a depth of field scale. However, the depth of field is so great that we usually preset for three feet and forget about focusing.

The Sea-Eye 21mm lens, Sea-View IV viewfinder and

Nikonos camera are shown mounted on a Seacor Single Sea-Mount (the tray and left bracket) with a second Sea Arm Bracket attached to the right side. Twin Sea-Arms are mounted on these brackets. These arms are detachable, adjustable, and are available with fittings for attaching Oceanic Products, Subsea and other strobes.

THE UW-NIKKOR 15mm LENS

The Nikon 15mm wide-angle lens is the Rolls Royce of wide-angle lenses for the Nikonos camera. It has a 94° diagonal picture angle; aperture settings for f2.8, f4, f5.6, f8, f11, f16 and f22; and can be focused from one foot to infinity. Both the lens and optical viewfinder are designed specifically for underwater photography and cannot be used in air.

The control knob for focus is at the photographer's left of the lens as it is with other Nikon lenses for the Nikonos, but the control knob for the aperture protrudes downward at angle slightly more than 45° to the lower left. The aperture and focus scales are underneath a curved port at the photographer's right

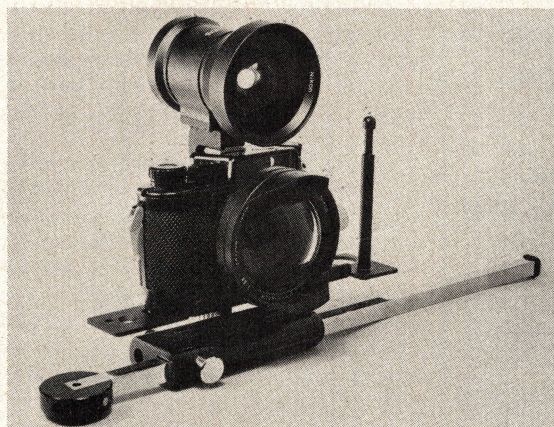
side of the lens. Holding the camera in the right hand, you can adjust both aperture and focus as you read your settings without having to turn the camera around or flip it over backwards. This is an important feature if you are using twin strobe arms.

The Nikon 15mm lens offers several advantages:

1. The optical viewfinder produces incredibly bright, sharp images. It is the finest optical viewfinder we've ever used.
2. The 15mm lens has the widest picture angle for a Nikonos lens of its optical quality of which we are aware.
3. It is lightweight, compact and has two visors at the top and bottom which protects the dome port from impacts.

As for disadvantages, when you make aperture and focus adjustments, you must align their scales with a small painted mark, and this mark is hard to see in dim, underwater light. We compensate by aligning the scales with the bright screwhead

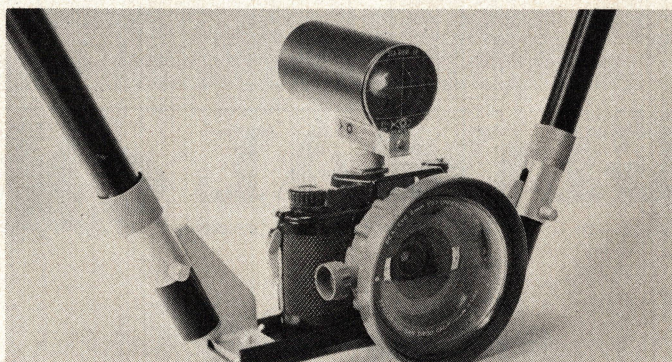
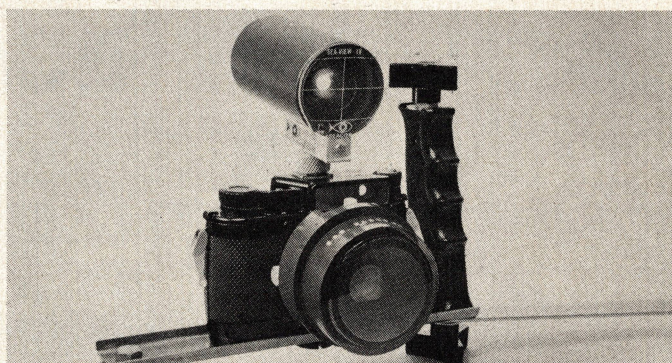
The 15mm lens, optical viewfinder and Nikonos camera, are shown mounted on a Subsea Nikonos bracket, and with a Subsea universal arm for using a wide beam Subsea strobe. The arm attaches to the post on the bracket.



1) The UW-Nikkor 15mm lens. Camera is mounted on Subsea Nikonos Bracket with arm for strobe.

2) The Opal-Eye fits over Nikonos 35mm lens and widens angle to that of 21mm lens with dome port.

3) The Sea-View IV optical viewfinder is designed especially for use with the Sea-Eye 21mm lens.



photography by Authors

PHOTO QUIZ

1. Is it true that the wider the picture angle of a lens, the greater the depth of field at any given focused distance or aperture?
2. Are wide-angle lenses best used for small subjects?
3. Do wide-angle lenses make near subjects appear to be larger, and far subjects smaller and further away, than they really are?

NOTE: Neither Jim or Cathy, or SDM, can critique your work. Answers to the above: (1) yes, (2) no and (3) yes.

ASSIGNMENT

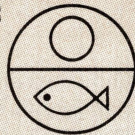
If you want more information about the wide-angle lenses discussed in this chapter, write to the following companies:

1. Green Things Opal-Eye — Send one dollar to Aqua-Craft, 3280 Kurtz Street, San Diego, CA 92110, for their catalog.
2. Sea-Eye 21mm Lens — Write to Seacor, Box 22126, San Diego, CA 92122, for a free brochure.
3. Nikon UW-Nikkor 15mm Lens — Write to Consumer Relations Department, Ehrenreich Photo-Optical Industries, 623 Stewart St., Garden City, NY for brochure.

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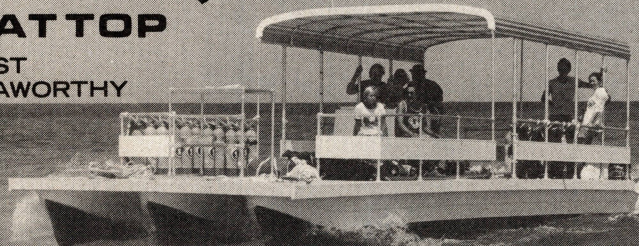
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Brennan Parkway's Marketing Director

Parkway Fabricators, a division of Great American Industries, announces the appointment of Michael Brennan to the position of Director of Marketing. Mr. Brennan is a native of Pennsylvania with



a degree from St. Francis College, Loretto, Penn. He served with the U.S. Marine Corps, being discharged as a First Lieutenant during the Viet Nam situation. He has served with Healthways as assistant sales manager and more recently with Farallon Industries as Vice President of Marketing.

His addition to the management group is another move in the continuing expansion program of this manufacturer of wet suits and Poseidon Systems. Brennan is a certified and experienced diver and will develop new concepts to better service the dive industry. He has relocated with his family to the east coast and will be operating from Parkway's headquarters in South Amboy, N.J.

Sonoma County Rescue Workshop

September 18-19, 1976, Santa Rosa Junior College, in northern California, will be the site of a Rescue Workshop open to all certified scuba divers and instructors age 18 and up.

The objectives are to train divers in rescue techniques, make individual divers aware of their own limitations and to stress diver awareness that will lead to the prevention of the need for rescues.

NAUI Instructors Jack Witt and David Nagle are the Directors of this event which is supported by NAUI, PADI, Los Angeles County, YMCA and NASDS.

Guest speakers for the pool, ocean and classroom sessions are Dr. Christopher Dueker, author of *Medical Aspects of Sport Diving*, Dr. Takashi Hattori of the Pacific Grove Diver Rescue Unit, Steve Webster, Ph.D. in Marine Biology and Jeff Hammett, head diving instructor and teaching specialist at Stanford University. David Nagle is a member of the Sonoma County Underwater Recovery Team and will discuss the unique hazards for divers in the county. Jack

Witt will lend his expertise on diver rescue gained from organizing and conducting several other rescue seminars.

Registration fee for the workshop is \$10 payable in advance. Profits from the workshop will be donated to the Sonoma County Sheriff's Office for the Underwater Recovery Team. Plans are to purchase an inflatable craft for the recovery team's use. Registration fees should be mailed to Sonoma County Diver Rescue Workshop, 875 Ilima Court, Palo Alto, CA 94306. Include a self-addressed envelope with 26¢ postage in order to receive all the additional information.

PADI Course Directors Workshop

For the first time, a national training agency held a workshop to train the Directors of its Instructor Training Courses. PADI recently conducted a three day workshop in Racine, Wisconsin for 30 Directors or soon-to-be Directors of ITC's.

Participants came from virtually every part of the country, with 15 states represented in all plus Canada and Bermuda. The purpose of the activity was to orientate the directors to the latest changes in PADI Instructor Courses and to standardize the courses by gaining a common understanding of PADI philosophy and teaching techniques.

Ralph Erickson, PADI President, and Dennis Graver, National Training Director, conducted the event. The PADI Course Directors Guidelines were reviewed, many new PADI policies, standards changes and teaching techniques were discussed and individual interviews were held. The directors participated in open water exercises from basic scuba emergency ascent training through divemaster rescue techniques in the cold waters of Racine Quarry.

Those successfully completing the workshop are qualified to conduct PADI Instructor Courses and are additionally sanctioned to hold Open Water Instructor Seminars to upgrade PADI instructors to the preferred rating of Open Water Scuba Instructor. The OWSI rating is reserved for members who have received a formal orientation to the series of PADI open water training programs.

PADI ITC's are conducted only by PADI Master Instructors who have attended such a workshop. The next Course Directors Workshop is set for January, 1977 in California. If the knowledge to be distributed, shared and exchanged is even half as good as that of the Racine Workshop, it will be time well invested by the participants.

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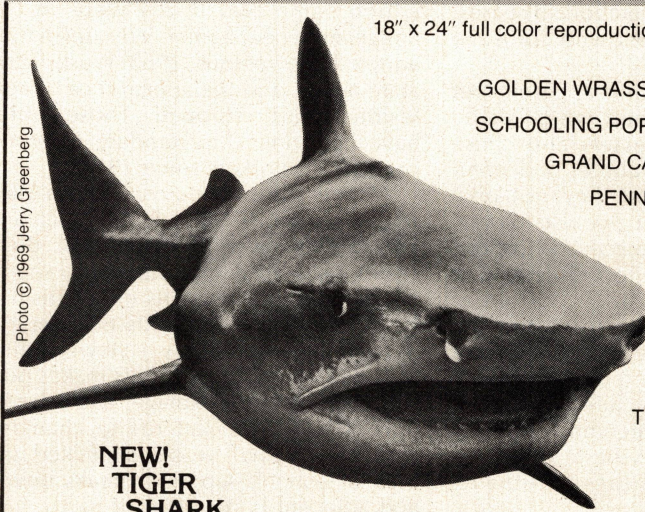


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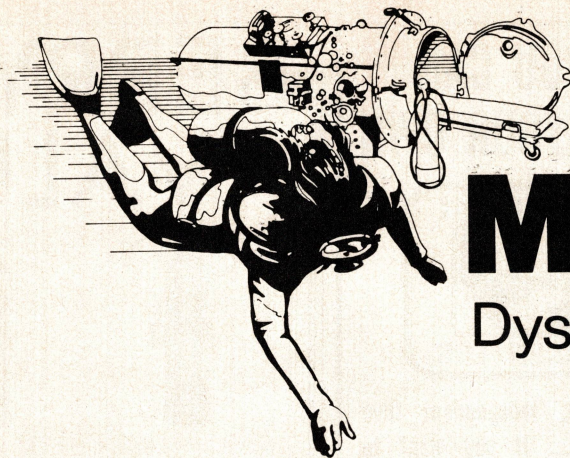
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Medifacts

Dysbaric Osteonecrosis

By Chas. V. Brown, M.D.

Man goes where the action is. Over the centuries, he has gone deep under the sea for food and treasure, and down in caissons to burrow out underground passages. He sought rich reward, and he was willing to pay the cost in hard effort, and also in risk, for sharks, narks, deafness, and bends awaited the unwary or the unfortunate. But there was a deferred cost, of which he knew nothing, and what he didn't know, hurt him. Today we understand dysbaric osteonecrosis, but the knowledge is recent, and many still walk about with tiny time bombs near their joints, awaiting the moment to explode.

Aseptic bone necrosis has been known for a long time. The term simply means bone death not due to infection. The cause is blockage of circulation. Bone marrow has excellent circulation, but the outer bone cortex, which provides structural strength, consists largely of solid calcium salts and has poor circulation. The blocking agent is usually clots, red cell emboli, or fat emboli, and aseptic necrosis is seen in conditions which favor these: alcoholism, severe fractures or burns, bleeding and clotting disorders, high blood fat and cholesterol levels, liver disease, certain metabolic diseases, and prolonged treatment with cortisone like hormones.

More recently it became apparent that there were other emboli which could block bone cortex vessels and cause aseptic necrosis: the bubbles of decompression sickness. And they not only block directly, but also give rise to fatty, cellular, and platelet emboli and to clots, which multiply their effect. This kind of bone necrosis was clearly a hazard of abnormal pressure exposure, and deserved a special name to distinguish it from other kinds. Just four years ago a major symposium was called in Galveston, Texas, and it was recommended that we adopt the term, dysbaric osteonecrosis, which literally means pressure related bone death.

Early interest in this strange variant of decompression sickness arose in England, where Haldane had developed the

first decent decompression tables. Sporadic cases had been reported with increasing frequency for some 65 years, and in 1959 the Medical Research Council became actively concerned. The first x-ray survey for osteonecrosis was run the following year, on Dartford Tunnel workers, and showed silent (no symptoms) lesions in a lot of men who had a known prior history of bends, but also in some who didn't. These men were not yet crippled, and nobody got very excited. It wasn't until 1967, several tunnels and x-ray surveys later, plus some crippling, that industry took much notice. By 1972, surveys were showing up to 50% incidence of osteonecrosis in seasoned workers. Other European experience was similar, and Japan reported 100% incidence in middle aged professionals.

Back in America, when Dr. Eric Kindwall took over the hyperbaric facility at Milwaukee's St. Luke's Hospital, he was astounded to learn that sewer tunnel workers were getting only about a third of the decompression time that Navy practice would have required. Sure enough, X rays showed that about one third of them had silent bone lesions, of which some two thirds were in the danger area near a joint. Wisconsin then adopted the famous 1963 Washington State tables, and the appearance of new lesions nearly stopped. Those tables have been the U.S. standard for compressed air workers since 1971.

What is an osteonecrosis lesion? Why does it remain silent so long? When and why does it become dangerous? Bone cortex gets by with a relatively sparse blood supply because its metabolism is slower than that of most tissues. Yet it is alive. Bone is constantly, if slowly, being resorbed and reformed. This makes possible the repair of damage, and adaptation of structural patterns to changing stresses. If a small vessel is blocked, the area of bone it supplied breaks down, and adjacent bone which it partly supplied may lose some of its ability to repair damage. In most parts of a bone, this has no more effect than a small hole in the

middle of Boulder Dam — a defect, yes, but no failure and no symptoms.

But if the defect is close to a joint surface, the time bomb is armed. Wear and tear causes gradual erosion, while repair is no longer adequate. Sooner or later, the weight bearing joint surface collapses into the necrotic defect, or dead bone in the defective area separates and behaves as a foreign body. For the victim, it is instant or gradual crippling.

A silent lesion may be recognized on X ray by its decreased density, indicating bone resorption, or by an area of increased density about it, which represents attempted repair. But X rays are only shadowgrams, and it takes more than four months before there's enough change to show on the film. It can be well over ten years before crippling occurs. It's easy to see why the relation between decompression bubbles and disability was so difficult to establish. Today, new diagnostic techniques make possible earlier discovery of silent lesions. One such is scintigraph scanning after injection of radioactive technetium, which concentrates in the active repair zone about the lesion. Another is EMI scanning, a highly sophisticated x-ray procedure with computerized assist, that shows details of single body slices instead of the usual full thickness view with its superimposed shadows.

Bone lesions can occur most anywhere, but the common sites for crippling are the large joints. For some as yet unknown reason, divers tend to get shoulder hits, while with caisson workers, it's more often a hip or knee. Once the damage is done, there's no way to restore the joint to normal. Hyperbaric oxygen helps some, bone grafts may help, but are often disappointing. Severe cases require orthopedic surgery for installation of artificial joints. These let you put your crutches away, but don't throw them out, as the relief is not permanent.

Anyone considering a career in commercial diving should be aware of the impact this bleak picture is having on the industry. Decompression schedules had

been designed to strike the best balance between minimum bends hits on the one hand, and minimum nonproductive chamber decompression time on the other. The new tables called for a lot more chamber time, which meant a lot of money. Furthermore, compensation insurance carriers were hard hit by the revelation that osteonecrotic crippling was work related — it cost them over two million dollars for Lincoln Tunnel workers in 1962 — so of course up went the premiums. Industry of course began looking for ways to do without divers. On the recent San Francisco BART project, means were devised to build a tunnel using the fewest number of pressurized man-hours per construction unit in history.

When workers must go below, the emphasis is on minimizing the number of decompressions they have to make. One approach is saturation diving. You live and work underwater for some days, then need decompress only once. A still safer approach is to keep the worker at one atmosphere, for instance in a capsule which mates to the work area. The most innovative answer is England's A.D.S. — atmospheric diving system — a cross between a dive suit and a robot. It weighs nearly 1000 pounds. You climb in and walk it about the sea bottom to 2000 feet without exposing yourself to pressure.

Are sport divers much afflicted with osteonecrosis? Since they don't get long bone X rays, no one can say for sure. It seems certain though that the more you pile up predisposing factors, the greater will be your risk. These include, besides the disorders already mentioned, a large number of dives, deep dives, long dives, stressful dives, fast ascents, age, obesity, and previous bends. And there's another possible factor that has been generally ignored. A scientist studying osteonecrosis in mice noted that safe diving profiles became unsafe when only the rate of compression was speeded. The reason is not known — one theory involves unbalanced gas osmotic pressure during the rapid gas absorption phase of the dive.

The way to stay out of trouble, then, is to avoid the no decompression limits by an ever wider margin, as predisposing factors add up. And, if we're like mice, maybe we should avoid fast descents.

Medifacts Addendi

DECOMPRESSION SICKNESS UPDATE

There may be many reasons for the great variability in bends incidence under similar conditions. For instance, there is the pure chance factor of where a bubble happens to lodge. However, it is now clear that a major factor is variability in initial formation of the bubbles.

Dr. Spencer of Seattle reports on Doppler monitoring of volunteers subjected to various chamber dive. One fellow

(Continued on Page 68)

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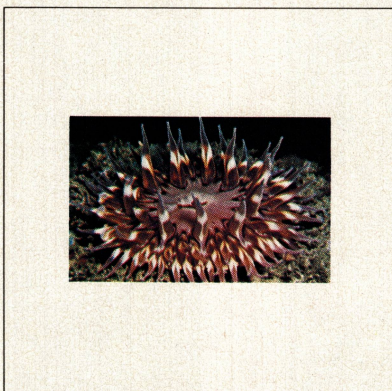


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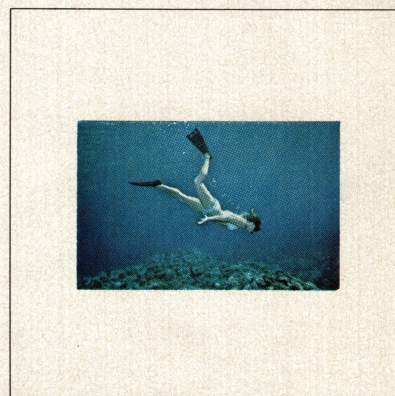
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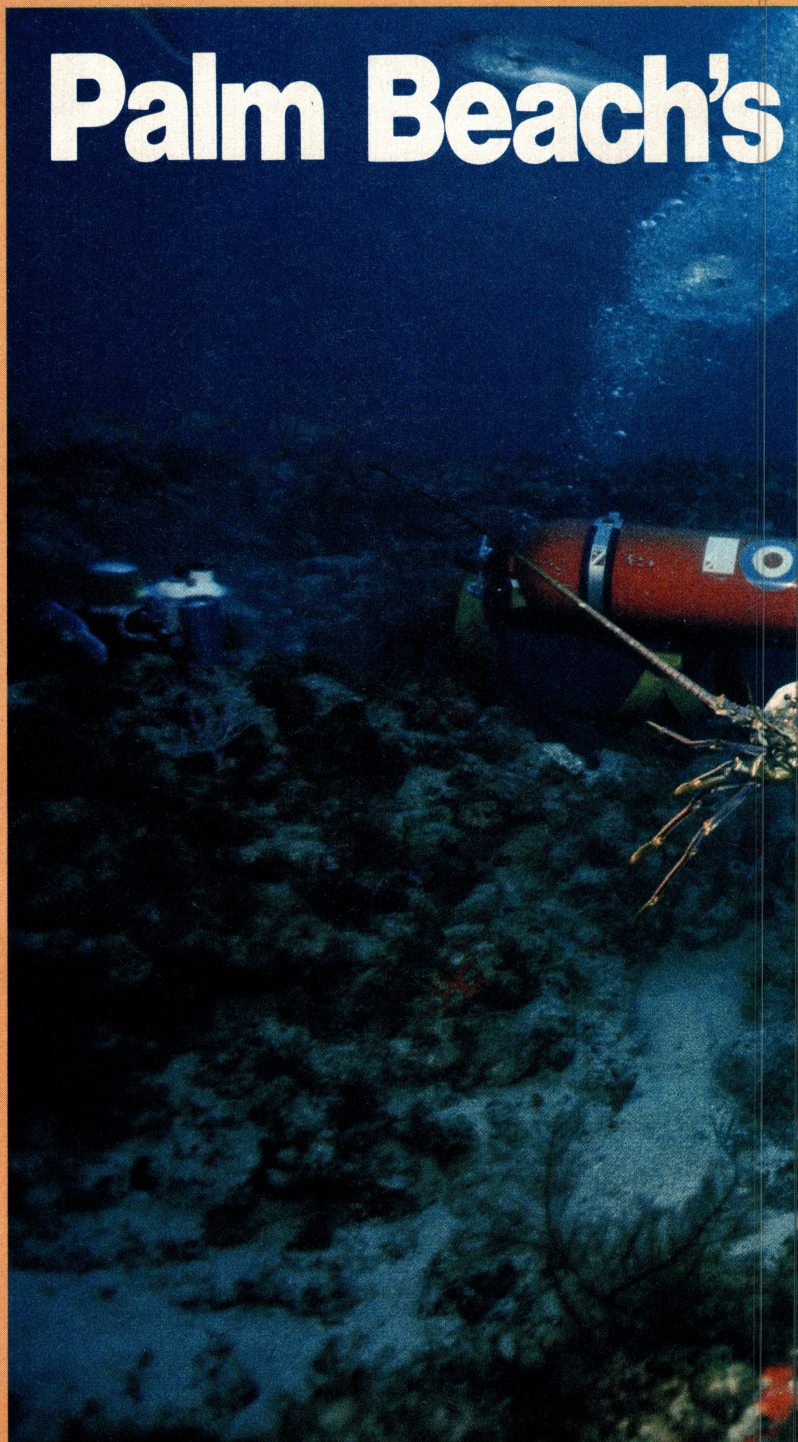
The phenomena that makes diving off Palm Beach, Florida, exceptional are the Gulf Stream currents that sweep so close to shore. The beaches, inlets, bays and harbors are washed clean of crud and pollution by clear, blue tropical waters. Thus, the area is not only blessed with warm, clear water — it also teems with an amazing abundance and diversity of marine life that rides in on the currents of the stream. Many of these make up permanent residence and continue to multiply. As a result, virtually every available nook and cranny is occupied by marine creatures and competition for living space is so intense that reefs are as crowded as a New York subway during the rush hour. Even the water beneath dive shop docks on Lake Worth, a badly polluted section of the Intracoastal Waterway,



photography by John Larsen

Above, a diver explores one of the many wrecks off the Palm Beach area. Right, while drift diving in one hundred feet of water at Margate Hole, part of Deep Reef, divers take time to grab some lobsters.

Palm Beach's



is clear enough for underwater photography when the tide is high — and you will sometimes see more fish under these docks than on some Caribbean reefs.

However, the Gulf Stream, which provides Palm Beach with its clear water and abundance of marine life, also presents the challenge of diving in strong and unpredictable currents. Contrary to popular belief, the Gulf Stream (more correctly called the Florida Current) does not always flow steadily in the same direction at the same speed. A series of gyres and eddies produce near shore currents that are constantly shifting and changing. The average current off Palm Beach is northward at a velocity of around one knot. But there is often no current at all, or counter currents and cross currents that sometimes hit

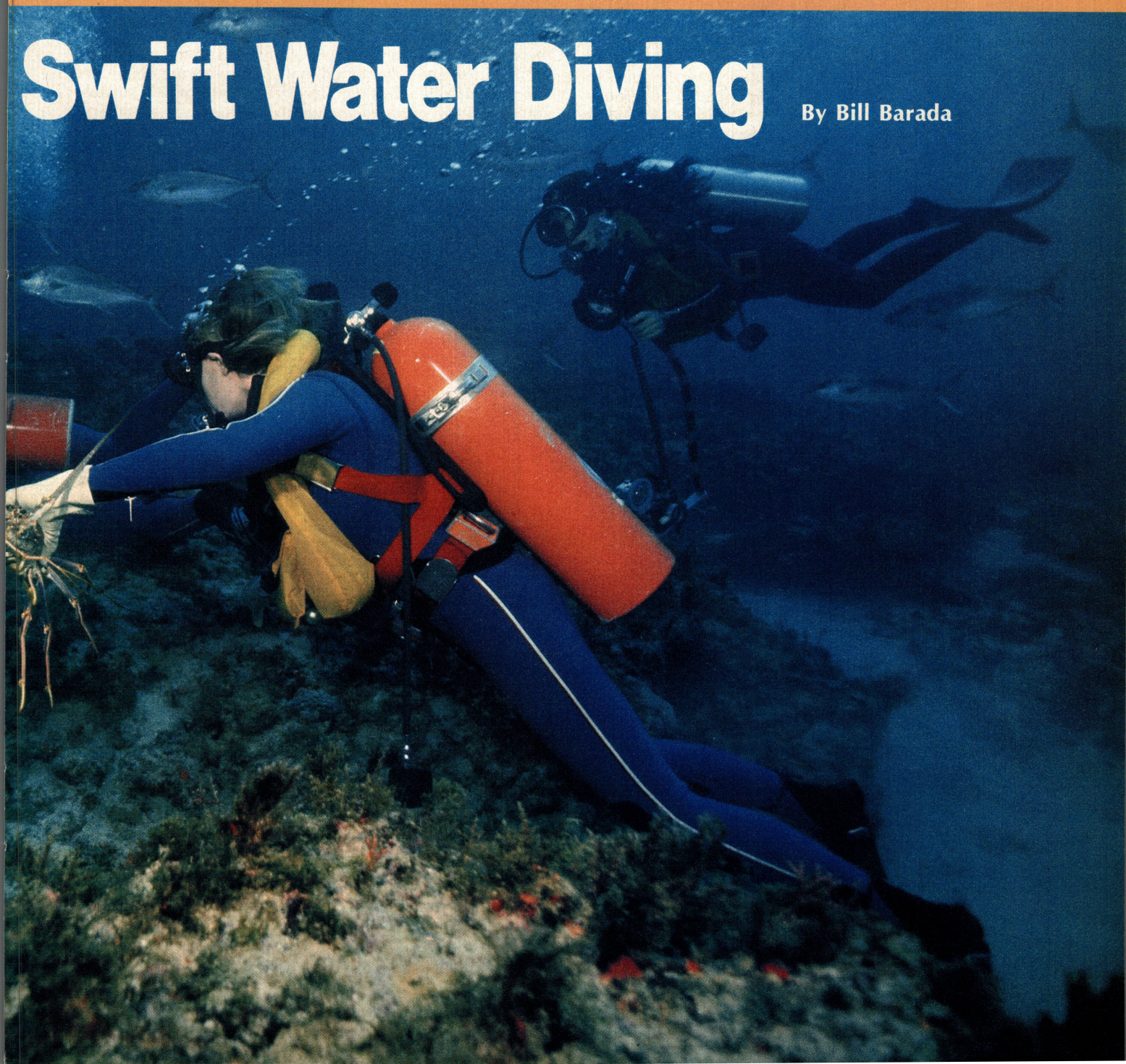
velocities as great as five or six knots.

These currents are an old story to Palm Beach divers, however, and local dive guides use them to give customers an exhilarating and rewarding experience that cannot be duplicated in still water. If you haven't tried drift diving Palm Beach style you are missing a delightful and safe method of exploring areas where strong currents are encountered.

In order to fully appreciate the advantages of this type of drift diving you have to know something about the offshore conditions and terrain that make Palm Beach diving unique. Other places have more beautiful underwater scenery in the form of vast coral reefs, kelp forests, and spectacular drop-offs. But few places in the world can compare with these reefs for the

Swift Water Diving

By Bill Barada



beauty provided by swarms of marine creatures that form a moving tapestry of exotic and changing colors.

The reason for the unusual concentration of marine life is that hiding places are at a premium. Most of the natural reefs along the Atlantic Coast north of the Keys are remnants of an ancient shoreline that existed thousands of years ago when the sea level was lower. They consist of a series of ledges and outcroppings that run more or less parallel to shore at depths of around 40 to 90 feet. North of Jupiter these reefs are several miles offshore. But from Jupiter to just south of Palm Beach the shoreline drops quickly into deep water and the reefs are only about a mile out from shore.

This makes it profitable for dive shops in the area to run tours with small groups of around six people or less. Most have boats docked near hotels on Singer Island facing Lake Worth so you can step from your hotel into a boat and 10 or 20 minutes later be exploring a reef in 50 to 60 feet of water. After your bottom time is used up, you can return to shore and decompress over a hot lunch, then either hit the reefs again in the afternoon, or enjoy some of the attractions offered by the Palm Beaches.

Another advantage of small groups is that underwater guides can keep a close watch on everybody when the current is running strong. This lets them employ dive techniques that might be too risky with larger, more diversified groups. Specialized underwater activities such as spearfishing, photography, specimen collection and sight-seeing can usually be segregated into separate parties in different boats.

There is a wide diversity of dive areas available which range from wild, deep water caves and pinnacles near the Jupiter Inlet where huge jewfish, warsaw grouper and sharks are abundant — to beautiful coral encrusted tropical reefs south of the Lake Worth Inlet that swarm with huge schools of reef fish,

lobsters, and turtles that make them an underwater photographer's delight. At high tide even the inlet and Lake Worth offer excellent shallow water diving. These remain calm even when the Atlantic is whipped into a froth by oceanic winds and storms. Thus, Palm Beach divers are rarely blown out of the water and excellent diving in the warm Gulf Stream is available the year around.

One shop owner told me that 1976 was an exceptionally cold winter, and the water temperature dropped as low as 68 degrees. In summer the water goes above 80 degrees.

Most of the dive spots are relatively small in relation to other Caribbean reefs and many are simply ledges that project above a flat, sandy bottom. This is great because they concentrate an extraordinary density of marine life, but it is no place to put a large group of divers. Trying to keep 20 or 30 divers out of trouble in a strong current could give dive guides and boat operators nightmares. Also, the first few divers to run a ledge would probably scare the daylights out of choice specimens such as large fish, turtles and lobsters, so the rest of the group would see only a few strays. That is one of the reasons that drift diving in small groups is such a delightful way to explore these reefs. When you are floating motionless with the current the flipper noise and commotion that spooks fish are eliminated and you can often drift right through schools of fish, so close you can almost touch them. It is an effortless way to travel so your air supply lasts longer and you can cover a far greater area than when working from an anchored boat.

Drift diving is not new. It has been practiced for years in many areas of the world. It is usually done in mild currents over a large expanse of reef where divers can drop into the water almost anywhere and hit an interesting area. A live boat, or chase boat, usually tries to follow the diver's bubbles by

photograph by John Larsen



photograph by Thomas Purin



Left, a diver explores the wreck Mispah, one of the many wrecks near Deep Reef. Above, divers drifting with a swift current come upon a school of spadefish. The fish seem completely unalarmed as the divers join their school for a few moments. Right, diver hitches a ride with a passing sea turtle.

drifting with the current (and hopes that boat and divers end up within reasonable proximity of each other).

Off Palm Beach, however, the reefs are often narrow ledges surrounded by vast areas of sandy bottom. The only sure way of locating them is with a depth recorder because even when land marks are known it is easy to miss the ledge. If drift divers miss the ledge they are apt to end up floating over nothing but sand. Also, the ledges do not always run the same direction as the current and it is easy for a boat to lose track of the divers. If divers and boat become separated in a three knot current they could wind up more than a mile away from each other before the divers run out of air.

Drift diving Palm Beach style avoids these problems and dive shops insure that their customers enjoy a safe and rewarding experience by using a technique called a float dive or a float drift. Here is how it works:

One diver carries a small anchor that is attached to a nylon line leading to a sturdy surface float. When everybody is geared up and ready to hit the water this float is trailed behind the boat and the skipper puts the boat directly over the reef. Then a signal is given and all divers hit the water at the same time. The diver who holds the small anchor attached to the float line automatically becomes the group leader and controls the dive because the boat operator will follow the float and be ready to pick up a diver who might surface for any reason.

You drift with the current as you descend to the reef, always keeping the anchor man and float line in sight. If you have trouble equalizing, just hold to the float line until you can clear and continue your descent. The security and freedom from concern that float drifting gives you is difficult to describe. The knowledge that a boat is following the float above you and that you can surface and be picked up at any time is a

real comfort, especially when diving in a strong current. The person carrying the anchor is everyone's buddy and keeping him in sight is no more of a problem than buddy diving under other circumstances. The only disadvantage is that you can't stop drifting to take pictures, grab lobsters or stalk fish unless the anchor man and the rest of the group stops with you. This is true of all methods of drift diving in strong currents because the boat will continue downstream and, in rough water, stragglers are sometimes hard to find. That's why Palm Beach drift diving rules require that if you become separated and lose sight of the group, you are to surface immediately so the boat can pick you up and let you rejoin the group.

Float drifting has another advantage in that the group can stop and explore an interesting area and the boat will stop with them. In this case the anchor to the surface float is secured and the same procedure is followed as if diving from an anchored boat. In strong currents, however, one diver usually stays with the anchor to make sure the float, and the boat, are not gone when you return.

Letting yourself drift with a current is probably the most relaxing and effortless way to travel underwater that has yet been discovered. If you are weighted correctly and neutrally buoyant there is no need for exertion. The current carries you along, often faster than you could swim, and a panorama of the reef and its inhabitants unfolds before you that can be seen in no other way.

The diving areas available off Palm Beach are too numerous and diverse to describe in a single article but a description of a float dive on the Breakers Reef will give you an idea of what you can expect. This reef is located about a mile out from the Breakers Hotel a few minutes due south of the Lake Worth Inlet. It is at the extreme northern limit of the coral survival

photograph by John Larsen





photography by John Larsen

Above right, currents of 3 to 5 knots are far too powerful to swim against and on fixed anchor dives the anchor rope serves as a safety line from the boat to the reef. Below right, in 25 feet of water on Cable Crossing Reef a diver hand feeds some of the local fish.



zone and the feathery plumes of soft, gorgonian corals intermixed with formations of brain, rose and star coral make it the most beautiful of the Palm Beach reefs. A few other reefs south of the Breakers also have coral growths but the rest are too far north for corals to survive.

The Breakers Reef is about 200 yards wide and runs more or less parallel to shore for about two miles. The depth ranges from 45 feet at the near shore edge to 80 feet on the seaward edge. Typical of the reefs in this area, the main ledge runs along the near shore side which plunges abruptly to a sandy bottom in 60 feet of water. The face of the ledge is a catacomb of caves, crevices, and tunnels in which big fish, turtles and lobsters love to hide. The highest ledges and biggest caves are found on the northern end of the reef. A forest of sea fans, sea whips and sea feathers covers the surface of the reef which slopes gradually seaward where it terminates with long, finger like projections that extend into grass covered flats in 80 feet of water. The north side of some of these fingers form 20 foot high cliffs that are also honeycombed with caves and crevices and are alive with fish and lobsters.

Different species of fish and specific types of marine life tend to inhabit certain sections of the reef in greater abundance than other areas and on a fixed anchor dive in which a limited area can be covered. Dive shop owners can usually put you into an area where you are most apt to find the kind of diving you most enjoy. For example, divers looking for seashells or tropical fish specimens will find the best hunting among the finger reefs. Lobster hunting is usually excellent in this area and big hog snappers, mutton snappers and grouper are not hard to find. Huge schools of barracuda and amberjack hang out around the north end ledge and jewfish and turtles like to hide in the deep caves. The entire reef swarms with schools of reef fish which tend to stay in certain areas. In one place porkfish will be so thick they almost blanket the reef. In other places it will be spadefish, in another it is schools of goatfish, and in another it will be grunts, or chubs. Huge rays are found sleeping on the sand and occasionally a rare sailfish, cobia or dolphin will flash past overhead.

You can see some of these while working in a limited area from an anchored boat, but you can cover almost a mile of reef on a drift dive and have a chance of seeing them all.

On our dive we drifted into a huge school of barracuda and hundreds circled us so tightly they formed a wall of moving fish. Huge amberjack followed us for awhile, often coming so close we could reach out and touch them. The fish seemed almost totally unafraid and we drifted amidst schools of porkfish, goatfish and grunt that paid no more attention to us that they would to a lifeless statue. We cruised above crevices inhabited by big grouper and hogfish that didn't even move as we went past. We passed through schools of baitfish so dense it was like floating into a cloud. Big rays and turtles remained motionless on the bottom, undisturbed by our presence, and we even saw lobsters walking in the open with their bodies fully exposed. We stopped a few times to snap pictures and grab a few lobsters, but even so, we had covered almost a mile of reef by the time I ran low on air. Equally important, the dive was so relaxing that I was probably more rested than I was before I started.

At present there are three dive shops that offer dive trips to Palm Beach reefs and visiting divers would be well advised to utilize their services, at least until they become acquainted with the area. A lot of divers have spent unproductive days exploring sandy bottom because they couldn't find the right reef. The guides know the reefs and can put you into an area where you will be apt to find what you are looking for, and the unpredictable nature of the currents make it important to learn the safety precautions adopted for this area.

The three shops are: Frank's Dive Shop, on East Blue Heron Boulevard, which is owned and operated by Frank Hammett.

The Colonades Undersea Center in the Colonades Hotel in Palm Beach Shores which is managed by John Larson, and Norine Rouse Scuba, Inc. in the Buccaneer Yacht Club in Palm Beach Shores which is owned and managed by Norine Rouse. All of the shops utilize similar dive techniques and safety precautions, but the difference in the attitudes and policies of the shop operators provides visiting divers with a distinct choice in diving styles.

Frank Hammett is an avid spearfisherman who loves to hunt both big fish and big sharks, and he is a respected professional in both fields. Stories of Frank's spearfishing and shark hunting feats have become legends among local skin divers. He has been reported as being able to burn up the air in a 72 cubic foot tank in nine minutes, yet surface with a jewfish under each arm and two more hanging on a stringer. Frank knows every rock and rubble patch in the area and knows where and when to hunt for all kinds of fish, and sharks. His favorite places are north of the Jupiter Inlet where deep reefs and caves and fierce currents keep the average divers away. Frank says, "North of Jupiter Inlet is not good for photography, but spearfishing and lobsters are very good in these areas, and it is also good if you are looking for sharks."

Divers who like spearfishing and adventure will do well to check with Frank. He has a 31 foot Bertram sportfisher he has named *The Shark Killer* that is equipped with bunks, galley and head. Frank introduced the rear diving platform in Palm Beach and the float drifting technique is his innovation.

Norine Rouse of Scuba, Inc. is at the opposite extreme. She is an outspoken conservationist who not only practices what she preaches, she insists that her customers practice it also. Norine is violently opposed to spearfishing and will not allow a speargun on her boat. Among her proudest possessions is a display of bent and broken spearguns hanging on the wall of her shop. Her protective attitude toward marine creatures is not limited to fish. She collects seashells, but takes only dead ones, and her customers are not permitted to take living shells. The only marine creature for which she makes an exception is lobsters and she has no objection to lobster hunting.

Norine's dive trips can be a lesson in marine biology and fish behavior. Her enthusiasm for diving and for the ocean is unbounded, she is intimately acquainted with the reefs, and has pets in every area that come to greet her and let themselves be stroked and petted. She knows where the most beautiful and shy creatures are apt to be hiding, which animals visit which reefs during the different seasons, and loves to introduce people to some of the marine mysteries she has observed.

Divers who are conservation minded and who like to observe and study the strange antics of underwater life would do well to check with Norine. She has a 28 foot Hurricane that can carry ten divers plus the crew and can run as many as four reef trips per day.

The Colonades under John Larson follows a middle of the road policy between these two extremes. John is a professional photographer and teaches underwater photography classes at The Colonades Undersea Center in the Colonades Hotel in Beach reefs and the vagaries of Gulf Stream currents. He is more than willing to help customers get good pictures and knows where, how and when to take advantage of the special features offered by different reefs. He is equally willing to take groups on spearfishing, shell collecting, or specimen collecting dives and can put you in the area most likely to produce the best results. The Colonades has two boats and try to put divers with different interests in different boats. Divers who like to try a little bit of everything or would like to sharpen up their underwater photography should check with John Larson.

All three shop operators are certified instructors and all the shops employ specially trained guides who are also certified instructors. Each is interested in handling large groups if reservations are made far enough in advance. ➤

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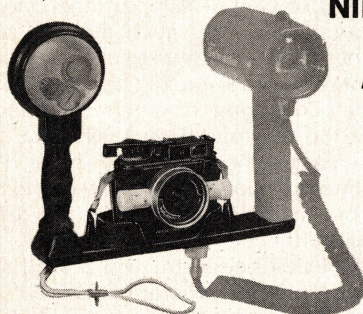
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IQ8 San Diego November 5-7

The largest dive convention of the year will be held November 5-7, 1976, in San Diego, California. The Eighth International Conference on Underwater Education, IQ8, sponsored by the National Association of Underwater Instructors, NAUI, has consistently been the largest gathering of divers anywhere in the world each year. This year even more events and opportunities are planned for divers, instructors, manufacturers, speakers and filmmakers.

IQ8 will be held in downtown San Diego at the Convention and Performing Arts Center. The Royal Inn will serve as the main convention hotel. Shuttle bus service will be provided between the hotel and the Convention Center. Reservations at the Royal Inn are available at special reduced rates for conference attendees who register using the IQ8 reservation cards.

This year's program has been divided to meet the special needs of many different interest groups. For example, Thursday evening, November 4th a pre-conference select exhibit hour for store owners, managers or buyers will be held at the Convention Center. This will allow the exhibitors an added opportunity to meet and consult with the dive retailers.

Friday, Saturday and Sunday will feature more exhibit hours for everyone to view the manufacturers, travel agencies and all the other display booths.

Over 50 noted speakers are slated for Friday, Saturday and Sunday. Sessions will run simultaneously to allow a wide variety to feature presentations. Top quality speakers from around the world have been invited to present their unique and provocative papers. Many original research papers, study findings and specialty topics will be discussed at IQ8.

Friday evening, a social will be featured in the exhibit area. Two drink tickets are included in the registration package fees. This social will be an excellent opportunity to renew old dive friendships and also to meet other divers and exhibiting company representatives.

Saturday noon, an awards luncheon will honor some of those who have offered their continued service to NAUI and to the diving community. This Second Annual Awards Luncheon, hosted by Arthur Ullrich, former General Manager of NAUI, will recognize unsuspecting members of the audience with beautiful walnut plaques personally inscribed for each receiver.

Special Guest, Bill Burrud, of the television adventures series, will show some of his diving related adventure films on Saturday afternoon. Burrud will be available for autographs and rap sessions later on Saturday afternoon. The positive, professional attitudes that have been dis-



played by Burrud in his series have been a valuable contribution to our sport. IQ8 is proud to have him as their special guest this year.

Saturday throughout the day small group meeting rooms are available for special interest groups to utilize. Contact NAUI Headquarters to schedule a free meeting room for your dive group. Other instructional agencies, instructor course reunions, regional meetings for instructors, women instructors meetings and a NAUI Course Directors meeting have already been scheduled. Watch the IQ8 registration desk information board for the details for each of these meetings.

Saturday evening will be a gala film festival presented by Paul Tzimoulis, Editor and Publisher of SKIN DIVER magazine. Paul has organized the entire film festival and will act as master of ceremonies. Films from around the world will be screened — some for the first time in the United States.

Prize drawings will be held during the general sessions of the conference. Prizes totaling over \$2000 will be awarded to conference attendees. All prizes will be awarded and include trips, books, scholarships and diving equipment. You must be present to win these fabulous prizes.

Free IQ8 Conference Registrations are available. See if you qualify: 1. Each professional diving retail store is allowed one free conference registration valued at \$24. This registration may be used by the store owner, manager or buyer. With the select exhibit hour on Thursday, IQ8 is a retailers bargain. 2. Any NAUI Instructor who certifies over 100 NAUI divers this year will receive a complimentary \$24 registration. 3. Any NAUI Instructor who serves on staff for a NAUI Instructor Training Course this year will receive a complimentary conference registration valued at \$24. These free Conference Registrations are NAUI's way of

saying thank you to the instructors who support the organization in an outstanding way throughout the year.

Complete conference registration of \$45 includes admission to all sessions, film festival, social and drink tickets, exhibit admission, eligibility for drawings, awards luncheon and a copy of the *IQ8 Proceedings*. (After October 15th this package costs \$55). Conference registration only of \$24 includes admissions to all sessions, film festival, social and drink tickets, exhibit admission, eligibility for drawings. (After October 15 this package costs \$29). Additional tickets for any event of the *IQ8 Proceedings* may be purchased in advance at a savings.

A first in the diving community will be attempted this year at IQ8. *The Proceedings*, the written papers of the conference will be published in advance and available at the conference. Formerly, *The Proceedings* were not issued until about six months after the conference. With this new breakthrough, conference attendees will be able to review the abstracts of the various presentations and decide which papers they wish to hear in person.

Questions about IQ8? Write NAUI Headquarters, P.O. Box 630, Colton, CA 92324. Supplementary information sheets, program flyers, ticket information and special discounts on air travel, hotel rooms and after conference diving trips will be rushed to you. 🐠

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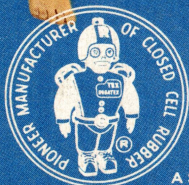
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A significant breakthrough has occurred in the YMCA Scuba Program during the past year. Aquatic performance standards have been specified for the certification of YMCA skin divers, basic scuba divers, and cave divers, as well as for assistant instructors and instructors. Comparable performance standards have been recommended for the certification of YMCA advanced divers.

The new standards are in the form of skin or scuba dexterity tests, which re-

YMCA

By Robert W. Smith

quire the performance of specific skills which can be quantitatively scored in terms of time or error or both. As an example, basic scuba students will be required to score at least 80 points on a scuba dexterity test consisting of five skill components such as:

SKILL ONE: Skin Diving Proficiency — Place mask and snorkel on bottom of pool, and place fins on pool deck.

1. Perform forward roll entry, surface swim (at relaxed pace) 40 feet, turn, moderate hyperventilation, surface dive, swim 40 feet underwater, recover and clear mask and snorkel, surface and exit.

2. Don fins, mask, and snorkel; make back entry (as if off small boat), surface and swim 40 feet, turn, moderate hyperventilation, surface dive and swim 40 feet underwater, surface and exit pool.

3. Giant stride entry, and swim 400 yards performing at least four head first and two feet first surface dives and using each of the following for at least 25 yards. Flutter kick — dolphin — back — side. Bulk of swim will utilize stroke of student's choice. Mask and snorkel must be cleared on one breath at some point during first step.

4. Points: 20

— Subtract 4 points each time student surfaces during an attempt to clear mask and snorkel.

— Subtract 2 points each time student surfaces prematurely during other underwater swims.

— Failure to perform required surface dives — subtract 2 points each.

— Failure to do required strokes, subtract 2 points each.

SKILL TWO: Scuba Familiarity.

1. Bailout, swim 50 yards, correct exit from pool (use ladder, mask on, regulator in mouth, fins in hand — do not stand under ladder while someone is exiting from the water).

2. Perform giant stride entry, surface,

with buddy, snorkel 100 yards, switch back to regulator, descend to bottom.

3. Commence buddy breathing while one diver removes his scuba, buddy breathe (skin diver, scuba diver) 50 yards, skin diver don his scuba while continuing to buddy breathe.

4. Switch to regulator that diver who was the skin diver has, continue to breathe while other diver removes scuba — and repeat 3.

5. Points: 30

will exit water correctly.

3. Diver (A) on pool edge will assist diver in the water by taking the (A) tank and placing it on the pool edge (emphasize this is simulating a boat dive).

4. Second diver (B) will remove his tank and hand it to diver (A).

5. Points: 20

— Subtract 2 points for any mistake in procedures.

— Subtract 5 points for safety violations such as loss of contact with

while towing; at side of pool simulate getting victim out of water (actually let him get out under own power) — by using a piece of foam to represent his chest (foam to be lying beside — not on victim) simulate CPR.

— Subtract 1 point for each mistake.

Scuba Instructor candidates must successfully complete 15 skill tests as part of their certification requirements. They must also pass three written exams encompassing ten areas of information.

PERFORMANCE STANDARDS DEVELOPED

— Subtract 2 points for each piece of equipment dropped during bailout.

— Subtract 2 points for each mistake made in exiting pool.

— Subtract 4 points each time a diver's face comes out of the water during equipment removal/buddy breathing.

SKILL THREE: Equipment Familiarization II — Surface removal of equipment (using buddy system).

1. On the surface one diver (A) will remove his scuba while being assisted by his buddy (B). During this exercise divers will remain in contact with a line and float, this is to simulate a trail line from a boat and the fact that a current may exist.

2. Diver (A) with equipment removed

float/trail line. The diver getting under or next to the ladder while other diver is exiting is also a safety violation.

SKILL FOUR: Simulation of Emergency Buddy Breathing Situation — Buddy breathe 400 yards

— Points: 20

— Subtract half a point for each additional 20 seconds until 22 minutes.

— Subtract 1 point for each additional 15 seconds over 11 minutes.

— Subtract 1 point per each additional 10 seconds over 12 minutes.

SKILL FIVE: Diver Rescue

Recover diver from bottom of pool, bring him to the surface depressing diaphragm, administer mouth-to-mouth

This quantification and standardization of performance requirements is significant because it clearly defines what it means to be a certified YMCA Scuba Diver or Instructor. It defines it for the diving student and instructor candidates as well as for insurance companies and legislators. It defines it unequivocally in terms of numbers for which criteria can clearly be established. It defines it in minimum terms which allow the individual instructor or institute staff sufficient flexibility to use their initiative in creating additional requirements. Above all, it defines for the world the standards which must be achieved for certification within the YMCA Scuba Program. ➤



The new YMCA scuba standards are in the form of dexterity tests. The photographs here demonstrate skills number: three, equipment familiarization; four, emergency buddy breathing; and five, diver rescue and mouth-to-mouth resuscitation.



photograph by Ike Ikehara



photographs by Tom Mount

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• HYDRO PHOTO • HELLOPHONE

Medifacts

(Continued from Page 57)

bubbled in 10 out of 12 dives, while another bubbled in only 1 out of 11 similar dives. A different man showed bubbles after a 60 feet for 60 minutes dive, but not after a 70 feet for 70 minutes dive.

Dr. Spencer of Seattle reports on Doppler monitoring of volunteers subjected to various chamber dive. One fellow bubbled in 10 out of 12 dives, while another bubbled in only 1 out of 11 similar dives. A different man showed bubbles after a 60 feet for 60 minutes dive, but not after a 70 feet for 70 minutes dive.

A 15 minute dive to 150 feet considerably exceeds the 5 minute Navy no decompression limit, and did indeed produce bubbling in most men. One man, however, tolerated that dive without bubbles, and yet did bubble after 6 hours at only 25 feet, which is well within Navy no decompression limits. With this kind of unpredictable variation, it pays to be conservative.

AIR EMBOLISM UPDATE

Scientists at Sydney, Australia, have found that divers with a history of pulmonary barotrauma (lung tear) had stiffer lungs than other divers. The lungs has more elastic strength, and were harder to inflate. They theorize that the extra elastic fibers are unevenly distributed throughout the lung. If a small airway should be obstructed, air expansion during ascent would not inflate the blocked alveoli equally. Those with strong support would remain small, and those with weaker support would therefore have to expand faster, and so would tear more readily. Another theory would be that stiffer lungs have a different kind of elastic fibers, which break instead of stretching when the pressure of trapped air becomes too great.

Without fancy tests, we don't know which of us may have the stiffer lungs, so here's another reason not to dive with lung disease, or soon after a chest cold.

Scubamerica Hawaii

Continental's Scubamerica offers two dive programs to Hawaii. Each program consists of five full days of diving at either Maui or the Kona Coast.

The *Fairwind*, a 52 foot diesel powered sailing trimaran, provides accommodations for 25 divers for the five days diving off the Kona Coast. Her crew consists of certified scuba instructors and Coast Guard licensed skippers.

Brochures giving complete details on all Scubamerica diving tours may be obtained by writing to: Scubamerica Diving Adventures, P.O. Box 9000, Van Nuys, California 91406.

EXOTIC WRECKS WARM, CLEAR SEAS TROPICAL MARINELIFE

Would You Believe . . .
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in October

Inner Ear Rupture

By Gary D. Becker, M.D.

What would you do if you discovered a hearing loss after a dive? Wait several days or weeks to see if it would improve? Waiting usually results in an improvement because most hearing losses are due to a middle ear squeeze. However, if the loss is from an inner ear rupture, any such delay may result in a permanent hearing loss. Since scuba courses and related instructional books do not teach the student diver about inner ear rupture and its potential hazards, the purpose of this article is to disseminate such information. To do this effectively, a brief review of the anatomy of the ear and the causes and symptoms of external and middle ear squeezes will be discussed.

The ear can be most simply thought of as a funnel with a long spout. The funnel represents the outer ear, while the spout consists of the ear canal, middle and inner ears. A thin elastic membrane, the eardrum, divides the ear canal from the middle ear, whereas a bony partition divides the middle from the inner ear. In the middle ear are found three bones: the hammer, anvil, and stirrup. These form a connection between the eardrum and the inner ear. An eustachian tube connects the middle ear to the back of the nose. The middle ear end of the eustachian tube is wide, the end of which is attached to the back of the nose and surrounded by a valve. This valve is normally closed, and to open it, i.e. to allow transmission of air at a higher environ-

mental pressure, one must yawn, move the jaw from side to side, blow against pinched nostrils, etc. Because of the structure of the valve, air movement from the middle ear is usually easily accomplished. The bony partition between the middle and inner ear has two holes, called windows. One is occupied by the stirrup while the other is covered by a thin, elastic membrane. In the inner ear are contained the organs of hearing and balance, consisting of extremely thin sacs suspended and nourished in liquid.

Sound waves are gathered by the ear (funnel) and directed into the ear canal (spout), where they cause the eardrum and attached middle ear bones to vibrate. Since the last middle ear bone (stirrup) is loosely attached to a window in the bony partition of the inner ear, its vibration causes movement of the inner ear fluid. Movement of this (non-compressible) fluid is possible by simultaneous displacement of the thin, membrane covering the other window.

The eardrum vibrates most easily when the air pressure in the middle ear is the same as that in the ear canal. Any pressure difference between these two spaces will either suck the eardrum in or push it out, resulting in a taut drum, thereby diminishing its ability to vibrate. The purpose of the eustachian tube is to equalize any pressure difference between the ear canal and middle ear, thereby allowing maximum transmission

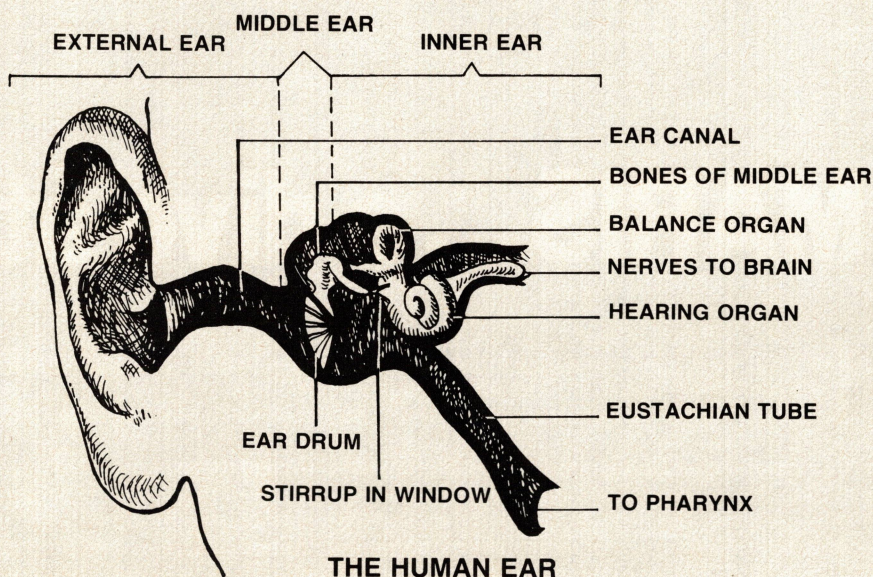
of sound waves to the inner ear.

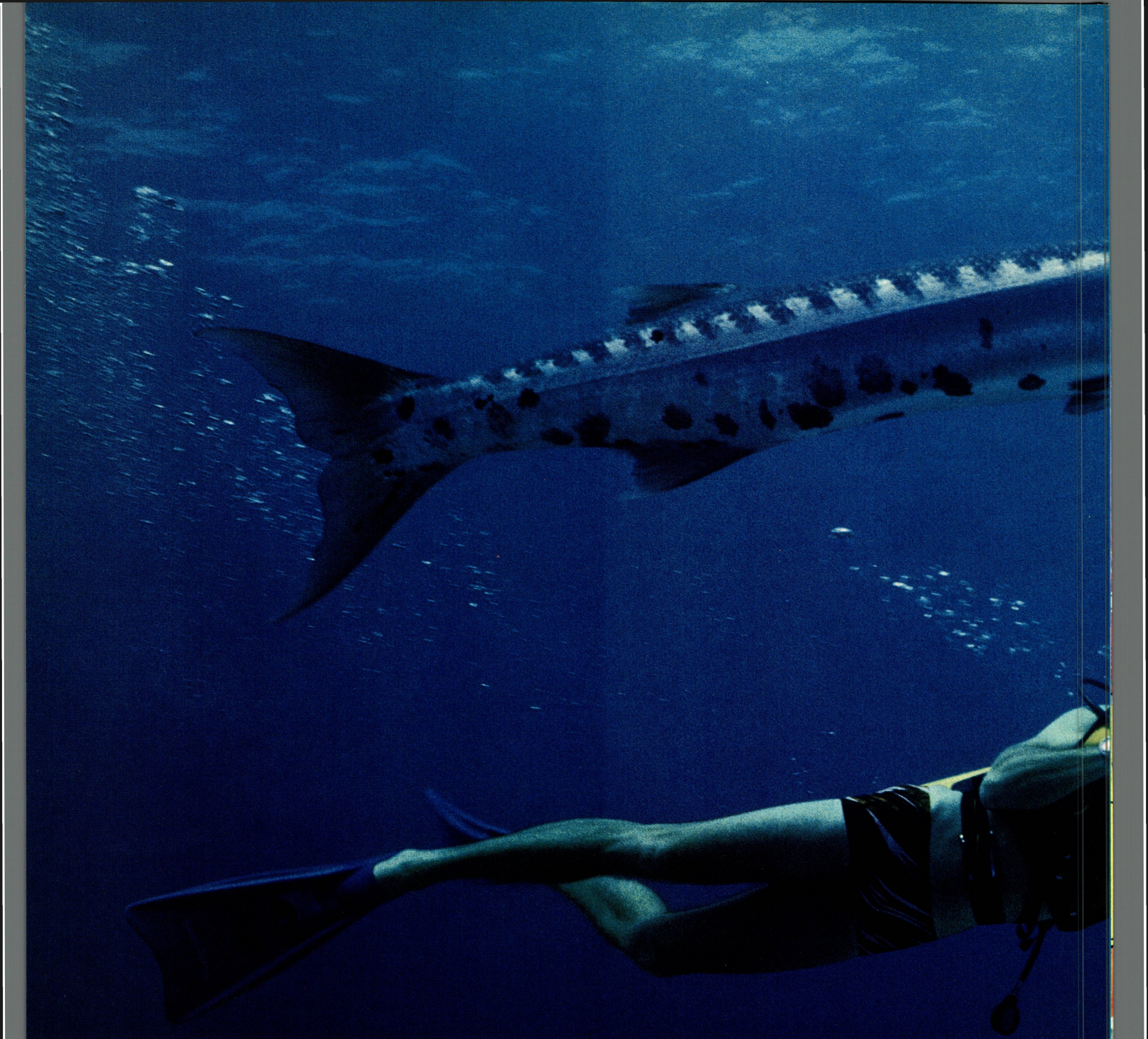
As the diver descends, the increased water pressure is distributed equally throughout the solids and liquids of the body, causing an equal increase in blood pressure throughout the body. If this were not so, the increased water pressure would collapse the blood vessels. Note, however, that since the increase in blood pressure and surrounding water pressure are the same, there is no absolute increase in blood pressure. That is, underwater, the blood pressure is the same relative to the surrounding water pressure as it is on land relative to the surrounding air pressure. No undesirable effects are noted since the increase in blood pressure and surrounding water pressure are the same. However, if there are any air spaces which have not increased their pressure to equal that of the surrounding pressure, a "squeeze" results. So a squeeze, in the usual sense of the term as used by scuba divers, is the presence of injury resulting from a pressure difference or barotrauma between two spaces or structures.

In an external ear squeeze, a pressure difference exists between the surrounding water pressure and an air pocket that has formed in the ear canal. This air pocket is usually the result of wearing a tight fitting wet suit hood, or ear plugs, which prevent free flow of water in the ear canal. The air "pocketed" in the ear canal is at a pressure less than the surrounding environment. Since, as discussed previously, the blood pressure rises equally in all parts of the body, including the ear, and since there is not an equivalent increase in air (or water) pressure in the "pocketed" area, the blood vessels start to rupture under the skin. This leads first to swelling, then bruising, blood blister formation, and actual bleeding into the ear canal. If the pressure difference between the middle and external ears is too great, the eardrum may rupture. This damage may result in a mild hearing loss, and possibly ringing in the ear. It usually clears over the ensuing few days to weeks as the swelling and blood in the ear canal disappear. This type of squeeze can be prevented by being certain that a good flow of water is present in the ear canal when diving. Never wear ear plugs, and either cut holes in the wet suit hood over the ear canal, or pull the hood away from the ear frequently so water can have access to the ear canal.

A middle ear squeeze results from a pressure difference between the environment and the middle ear. As one descends, water pressure pushes on the eardrum. This is compensated for by breathing equally high pressure from the regulator and allowing it to enter the middle ear via the eustachian tube. If the middle ear cannot be equalized

(Continued on Page 97)



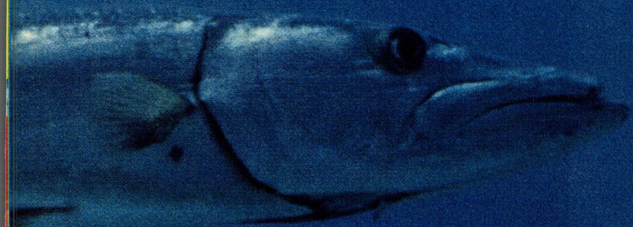
A full-page photograph showing a diver in the lower half of the frame, swimming horizontally. Above the diver, a large barracuda swims in the same direction. The water is a deep, clear blue with some light filtering from above.

STELLA MARIS... a dive at

Ever dream of diving on a reef where all the fish are so friendly that they follow you around like pets? Ever wonder what it's like to have a 30 pound grouper staring into your facemask . . . to hand feed five groupers at a time . . . or to be eyeball-to-eyeball with a five foot barracuda? If this kind of diving turns you on, then you'll find Stella Maris an absolute joy and the answer to your dreams.

Few dive resorts today can guarantee visitors big fish, let alone friendly ones. Stella Maris is one of the exceptions to the rule and there are more animals on the reefs than in the local zoo. Situated on one of the out islands of the southern Bahamas, Stella Maris is far from the commercial fishing grounds. The fish who abound these reefs are unmolested by either hook, net, or speargun. They have come to regard scuba divers as a source of food and entertainment rather than a fearsome predator.

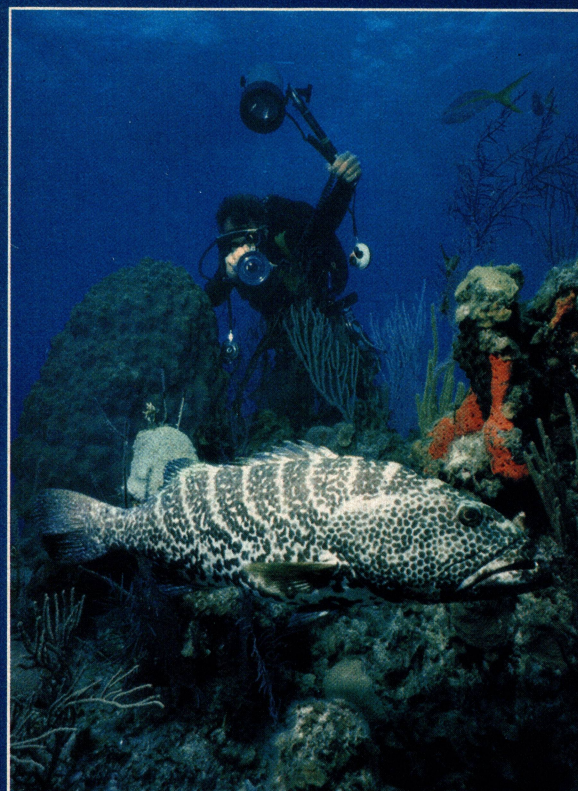
Still skeptical? Perhaps a trip to BARRACUDA HEADS, one of the more popular reefs of Stella Maris, will convince you.



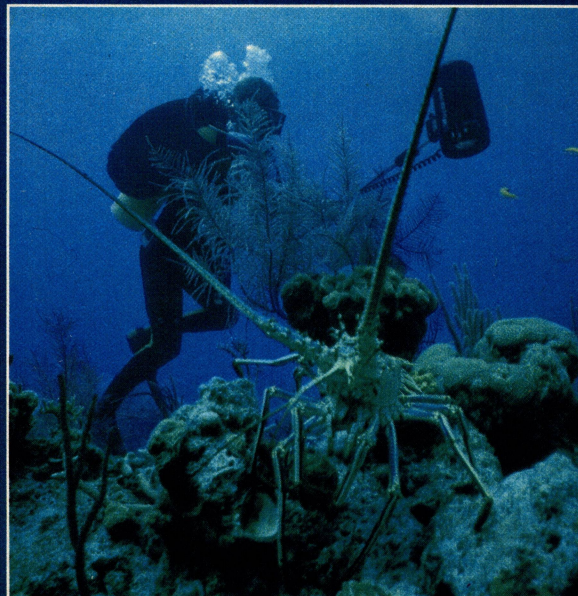
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Bahamian Resort Offers a Rare
Opportunity To Mix With Fishy Company

By Paul J. Tzimoulis



Marvin Ellis lines up for a shot of a 30 pound tiger grouper, a resident character of BARRACUDA HEADS.



photography by Author

No underwater zoo is complete without at least one tame lobster. This six pound crustacean is seen frequently strolling about and peeking out from his various coral cave retreats on reefs near Stella Maris.

Jorg Frieze, far left, photographs Bismark, the resident barracuda of BARRACUDA HEADS. This remarkable fish can be photographed as close as two feet in distance.

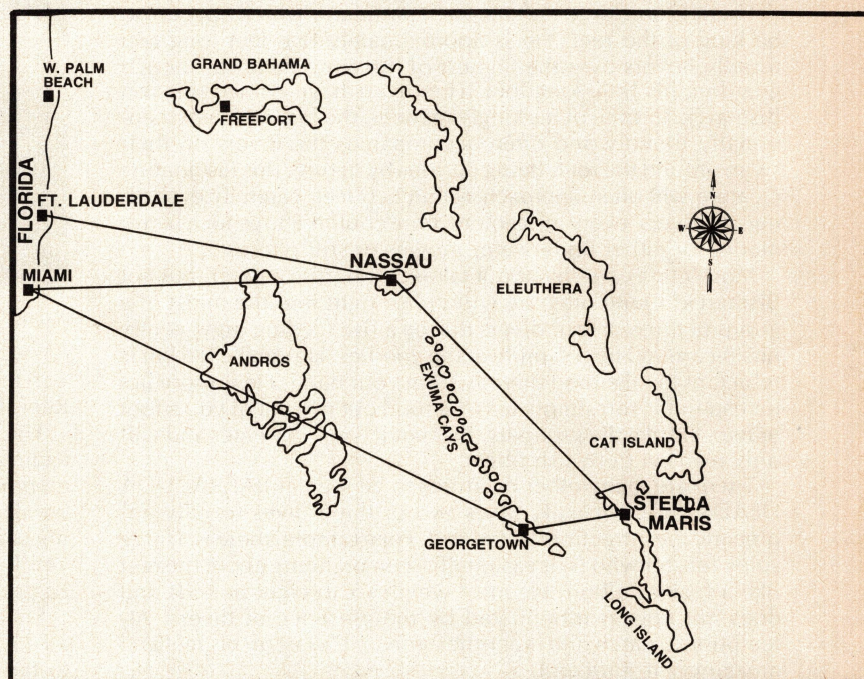


BARRACUDA HEADS is actually a group of six or seven large coral heads clustered together on a flat sand bottom. They are located on the leeward side of the island where the water is calm and protected. It is one of the dive spots closest to the marina and can be reached by boat in 35 minutes.

The depth at BARRACUDA HEADS averages 45 feet to the sand bottom. The larger heads measure 50 to 60 feet long, 30 feet wide and rise up 20 to 25 feet from the ocean floor. These bigger heads are virtually hollow, as they are honeycombed with small coral caves, winding tunnels, and many deep undercuts along their sides. The roofs and walls of these hollow caverns are often lined with brilliantly colored sponges and a sparkling variety of delicate hydroids, tunicates, and soft corals. The top and sides of each coral head are covered with a thick jungle type growth of sea fans, sea plumes, hard corals, sea whips, and lush marine life. Each head is like a miniature underwater rain forest filled with a wondrous variety of crabs, shrimp, and other small creatures.



Grouper feeding at the underwater zoo. BARRACUDA HEADS is occupied by a community of resident groupers. Most of these fish are Nassau groupers, one of the friendliest and most curious of the species. They like diver companionship and love to be fed pieces of conch, hot dogs or fish chunks. An underwater photographer's dream, he will patiently pose for hours. Berthed at the Stella Maris marina, the 28-foot Enterprise below stands ready to take divers to BARRACUDA HEADS and other nearby reefs. Situated on one of the out islands of the southern Bahamas, Stella Maris is far from the commercial fishing grounds and the fish are not molested by either hook, net or speargun and have come to regard divers as a source of food and entertainment.



As with most Bahamian reefs, BARRACUDA HEADS is occupied by a community of resident groupers. Most of these fish are Nassau groupers, one of the friendliest and most curious of the species. They range in size from six-pound babies to 25-pound adults. The Nassau groupers are very friendly and will often follow you around the reef like puppy dogs. They seem to like diver companionship and love to be fed pieces of conch, hot dogs or fish chunks. Nassau groupers are very gentle by nature and will readily take food from your hand.

As for their modeling ability, the Nassau grouper is the underwater photographer's dream come true. He will patiently pose for hours on end, permitting the diver to shoot pictures from the front, side, top or underneath. This marvelous fish is not one bit afraid of divers and will let you approach within inches of his body.

On several occasions I observed one large Nassau grouper parked on the sand bottom beside a small coral head. He remained perfectly still with his mouth open and gill plates

extended while five small cleaner shrimp proceeded to pick off microscopic marine parasites. Although the grouper knew he was in a vulnerable position, he let me approach to ten inches while I took repeated flash pictures of this fascinating symbiotic phenomenon.

Another species which also lives on the same reef is the red grouper. These are generally larger and much more aggressive — usually weighing from 20 to 30 pounds. Unlike the gentle Nassau grouper, big red is usually a bully. He hogs all of the food at feeding time, often driving away other groupers. And if there are two reds at the feeding site, they will often fight over the food. Sometimes the reds get so greedy they will even bite the hand which is feeding them. Visitors are usually cautioned about the red grouper's poor table manners, and it is suggested that heavy gloves be worn during fish feeding sessions.

One of the most beautiful groupers to be seen at BARRACUDA HEADS is the tiger grouper. There are usually two or three of these splendid creatures hanging around the reef.

They are beautifully marked with black and white tiger stripes along their sides. And their lips are shaded with a light yellow hue. Although this species has several crooked teeth hanging from the front of its mouth, they are not as mean as they might first appear. In fact, this species is ordinarily very shy and difficult to photograph. However, the tigers at BARRACUDA HEADS are so tame, they can be fed by hand and prize winning photos can be taken with ease.

The largest grouper to be found on the reef is a yellow fin grouper. He must weigh 50 to 70 pounds at least, but he is very shy and cannot be easily approached by divers. Given time and enough food offerings, he too will become part of this incredible underwater zoo.

The reef gets its name from the barracudas who live in the area. You will generally see two or three hanging over the coral heads during most any dive. There is nothing to fear as these 'cudas are very friendly and accept divers as part of their undersea environment. Although thousands of hotel guests visit this reef there has never been an incident where a 'cuda has displayed any aggressive behavior whatsoever. Like the other members of the reef, they are considered pets.

There is one large barracuda in particular which appears to be king of the reef. He is approximately five feet long and usually hovers over the highest of the coral heads as though guarding his little kingdom. The divers have named this fish Bismarck. In spite of his kingly manner, the big 'cuda is exceptionally friendly and often accompanies the divers on their swim around the reef. Being curious by nature, this fascinating creature will often approach within two feet, carefully eyeballing the divers' every movement. One couldn't hope for a better model for either underwater movies or still photos.

Most 'cudas are shy about taking food from a diver, but not Bismarck! Quite often he will cruise right into the midst of a group of three or four divers during a fish feeding orgy, gently nosing around for a sample of the goodies. He can be fed but is reluctant to take food directly from your hand. He is more apt to respond if you simply toss the food out in front of you a foot or two. Unlike the groupers, Bismarck is a picky eater and will only feed on fresh fish fillets.

There are many other creatures to be seen at BARRACUDA HEADS, and it usually takes two or three dives to fully appreciate the attractions of the reef. For example, there is a large spiny lobster who is occasionally seen prancing about the reef like a frisky stallion. He must weigh six to eight pounds and does not appear intimidated by the presence of divers. Attempting to catch him is another story. He's fast on his feet and amazingly resourceful.

There is a school of snappers which could be generally found in one of the coral caves and a spotted moray eel who timidly pokes its nose out of a deep crevice on rare occasions. On one fish feeding occasion, the commotion caused by competing groupers attracted two magnificent 80 pound amberjacks who cruised among the divers for a good 15 minutes before departing. There is always something new to see at BARRACUDA HEADS and one never tires from the playful antics performed by the clown-like groupers.

It should be pointed out that BARRACUDA HEADS is only one of approximately 35 different dive spots which are regularly visited by the Stella Maris guides. Other shallow coral reefs in the same area include: Angel Fish Reef, Flamingo Tongue Reef, Blue Tang Reef and Grouper Village. Dive depths range from 20 to 45 feet, allowing plenty of bottom time for underwater photography, sight-seeing, and fish feeding. It is the policy of Stella Maris that spearfishing is prohibited on these particular reefs since most all of the fish have become pets.

The north end of the island offers a distinctly different type of diving at deeper depths ranging from 60 to 130 feet. Here the water is much more blue in color and visibility often exceeds



150 feet. North End dive spots include such places as: Heidi's Reef, Deep Reef, Long Island Wall and Shack Ledge.

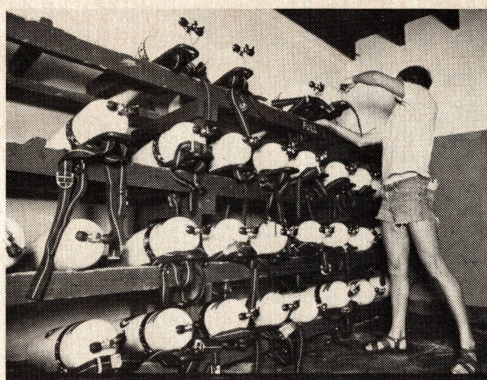
The east side of the island is the windward side and here again is another type of diving. There are majestic forests of elkhorn coral, as well as deeper beds of staghorn coral. The coral formations are usually larger and deeply etched by winding canyons. Among the more interesting spots of the east side you'll find House Reef, Coral Gardens, Grouper Valley and Eagle Ray Reef.

For a change of pace, once a week Stella Maris schedules an all day dive trip to nearby Conception Island. Located 14 miles to the northeast, this beautiful uninhabited island has been declared a natural bird sanctuary . . . thus preserving a virgin ecology both on land and underwater. Conception Island offers one of the most beautiful and breathtaking coral drop-offs in the entire Bahamas. Located only 200 yards offshore, this vertical wall starts in 45 feet of water and plummets vertically to a depth of 1000 feet. Visibility is often 200 feet plus, and the drop-off is adorned with an incredibly beautiful array of sponges, gorgonian fans, and black coral trees. The trip to Conception is usually the highlight of the week and by far the most popular trip offered at Stella Maris.

As for the hotel itself, Stella Maris Inn is perfect for divers. The accommodations are comfortable but not awkwardly luxurious. The service is friendly and the atmosphere is informal, yet things run smoothly and efficiently.

The hotel sits atop a high ridge, and the rooms are cooled by a gently blowing trade wind. There are 10 or 12 buildings grouped around the main building which houses the diving room, bar, and hotel office. Accommodations range from simply decorated rooms to suites and family cottages. All rooms are air conditioned for those who like it really cool.

The cocktail lounge is decorated in a rustic coral rock and wood motif, with many underwater photos and artifacts re-



Bismarck the barracuda joins the divers during a fish feeding session in hopes of sampling the menu. The dive shop at Stella Maris is well stocked with 80 U.S. Divers aluminum 80 cubic foot rental tanks, 40 rental regulators, and 100 snorkel sets. The hotel plane is a 10 passenger twin Beech which makes round trips to Nassau several times each day.



covered from nearby shipwrecks. It's the ideal setting for sipping a rum punch and swapping diving stories. Adjacent to the bar is the Stella Maris dining room, specializing in both Bahamian and European cuisine.

Stella Maris can accommodate 120 guests easily, for it is one of the larger hotels in the Bahama outer islands. Most of the evening entertainment centers around the hotel, and something different is scheduled for practically every night of the week. Events include: a steak barbecue, a patio party with a Bahamian band, a cave party, beach picnics, and more.

Stella Maris also has a complete marina and yacht club facility located on the leeward side of the island, two miles from the hotel. The marina features docking facilities, a complete repair shop, a restaurant, and kitchenette hotel rooms.

The marina is also the location of quite a large dive shop facility, including a special scuba training pool, air conditioned classroom, compressor room, equipment storage room, and photographic darkroom. At present, the dive shop maintains an inventory of 80 U.S. Divers Co. aluminum 80 cubic foot/3000 psi tanks. There are also 40 rental regulators (Calypsos and Conshells), 100 snorkel sets, and a variety of assorted weight belts, tank packs, and safety vests.

The compressor is equipped with two Mako air compressors which run simultaneously and an air storage bank. A third compressor is kept on standby in case of a breakdown. There are two dive boats currently in operation (a 28-foot and a 42-foot cruiser) and plans are being made for a third boat.

The dive shop is under the combined management of Stella Maris Inn and the Teach/Tour Diving Company. Located in Nazareth, Pa., Teach/Tour has successful dive resort operations throughout the Caribbean, including Tobago, Bonaire, Jamaica, and Grand Cayman. The newly formed partnership between Teach/Tour and Stella Maris Inn is designed to expand Stella Maris Inn's dive facilities and services. All new

dive equipment has been installed and the number of dive instructors doubled. In addition, Stella Maris has established satellite scuba operations in both Rum Cay and Georgetown, Exumas. Now Stella Maris guests can enjoy diving among three distinctly different parts of the southern Bahamas.

Working in conjunction with Stella Maris management, Teach/Tour has designed a very attractively priced one week dive vacation package for \$335 per person. This special tour package includes a room (double occupancy) for seven nights, three meals a day, hotel taxes and gratuities, ten scuba dives with tanks, packs, and weight belts, and a rum punch party. Additional dive trips are \$15 each. No special departure dates are necessary, this tour can start any day of the week.

There are several ways to reach Stella Maris, depending on which day of the week you decide to travel. There are non-stop flights to Nassau from many cities in the U.S. Bahamasair flies from Nassau to Stella Maris on certain days of the week, but be sure to confirm that the flight you desire is operational.

Stella Maris Inn also operates its own private charter flight service, utilizing a ten passenger twin Beech. The Stella Maris hotel plane departs from the Bahamasair hangar which is in the building next to the main air terminal. Reservations must be made in advance either via Teach/Tour Diving Company or by telephoning Stella Maris Inn direct. Round trip cost for the flight from Nassau to Stella Maris is \$68.

Another way to reach Stella Maris is by flying from Miami direct to Georgetown, Exumas, via Mackey International. Once you've cleared Bahamas immigration and customs, you can complete the journey aboard Stella Maris Inn's plane. The remaining distance is less than 35 miles.

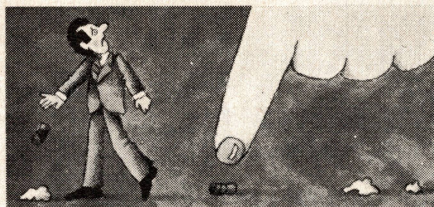
For more information, brochures, or reservations, you can write to: Ray Morrow, Teach/Tour Diving Company, P.O. Box 390, Nazareth, Pa., or to Jorg Friese, Stella Maris Inn, P.O. Box 105, Stella Maris Post Office, Long Island, Bahamas. ➤



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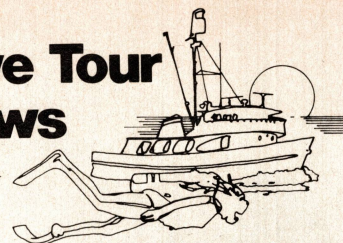
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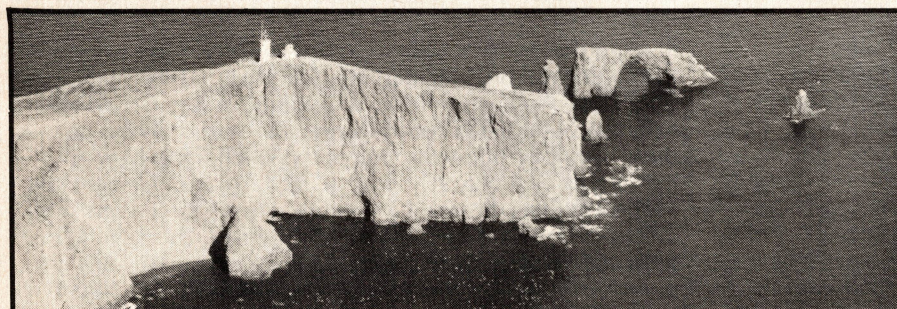
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Dive Tour News



- Sept. 1, 15, 29 — MAJURO — 9 days, Micronesian Expeditions, Salt Lake City, UT
- Sept. 2 — TAHITI — 15 days, Explorer Division, BSA, Los Angeles, CA
- Sept. 3, 12, 22—7 days, Capt. Phil Chalker, Tropic Diving Cruises, Inc., Ft. Lauderdale, FL
- Sept. 3—CAYMAN BRAC—3 days, World Wide Divers Inc., New York, NY
- Sept. 3—BONAIRE—8 days, World Wide Divers Inc., New York, NY
- Sept. 3 — BAHAMAS — 7 days, Tropic Diving Cruises Inc., Ft. Lauderdale, FL
- Sept. 3, 10, 17, 24 — BONAIRE — 8 days, Lisind Int'l, New York, NY
- Sept. 3, 10 — HAITI — 5 or 8 days, Oceaneers Dive Tours Inc., Hollywood, FL
- Sept. 4—LONG ISLAND, BAHAMAS—8 days, Ski & Dive Shop, Washington, DC
- Sept. 4 — BRITISH VIRGIN ISLANDS — 12 days, Trimaran Misty Law, St. Thomas, VI
- Sept. 4 — COZUMEL — 8 days, See & Sea Travel, San Francisco, CA
- Sept. 4 — SEA OF CORTEZ — 9 days, Sunland Int'l Tours, Beverly Hills, CA
- Sept. 4 — COZUMEL — 8 days, Oceaneers Dive Tours, Inc., Hollywood, FL
- Sept. 4 — FLORIDA KEYS — 7 days, Berry Distributors, Inc., Alsip, IL
- Sept. 5—SAN ANDRES—8 days, Go Diving, Inc., Minneapolis, MN
- Sept. 10 — SAN SALVADOR — 8 days, Horizons Int'l, Seattle, WA
- Sept. 11, 17, 23—BIMINI—5 days, Capt. Tom Guarino, Dive Boat Annie-Up, Key Largo, FL
- Sept. 11—ROATAN—8 days, Go Diving, Inc., Minneapolis, MN
- Sept. 11 — CAYMAN TO ROATAN — 13 days, See & Sea Travel, San Francisco, CA
- Sept. 11, 20 — BIMINI — 7 days, Capt. LaChance, Adventure Cruises, Ft. Lauderdale, FL
- Sept. 16 — KONA, HAWAII — 5 days, Horizons Int'l, Seattle, WA
- Sept. 17 — BONAIRE — 8 days, Happy Wanderer Travel, Scarsdale, NY
- Sept. 18—CARTAGENA, COLOMBIA—8 days, World Wide Divers Inc., New York, NY
- Sept. 18—MIAMI—10 days, Capt. Ed Deckard, Islanders' Cruises, Miami, FL
- Sept. 18—COZUMEL—8 days, Go Diving, Inc., Minneapolis, MN
- Sept. 18 — AKUMAL — 8 days, Lisind Int'l, New York, NY
- Sept. 18 — BONAIRE — 8 days, See & Sea Travel, San Francisco, CA
- Sept. 18 — BRITISH VIRGIN ISLANDS — 12 days, Trimaran Misty Law, St. Thomas, VI
- Sept. 19 — CARTAGENA, COLOMBIA — 8 days, Sunland Int'l Tours, Beverly Hills, CA
- Sept. 25—FREEPORT—8 days, Go Diving, Inc., Minneapolis, MN
- Sept. 30—HERON ISLAND—14 days, Bay Travel, Corona del Mar, CA
- Oct. 1, 8, 15, 22, 29 — BONAIRE — 8 days, Lisind Int'l, New York, NY



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Oct. 1, 8, 15, 22, 29 — HAITI — 5 or 8 days, Oceaneers Dive Tours Inc., Hollywood, FL
 Oct. 1 — COZUMEL — 8 days, Sunland Int'l Tours, Beverly Hills, CA
 Oct. 2, 10—BIMINI—7 days, Capt. Tom Guarino, Dive Boat Annie-Up, Key Largo, FL
 Oct. 3—BELIZE—7 days, Go Diving, Inc., Minneapolis, MN
 Oct. 3 — BAHAMAS — 7 days, Berry Distributors, Inc., Alsip, IL
 Oct. 5—BIMINI—7 days, Capt. Ed Deckard, Islanders' Cruises, Miami, FL
 Oct. 8 — BONAIRE — 8 days, Happy Wanderer Travel, Scarsdale, NY
 Oct. 9, 20, 29—BAHAMAS—7 days, Tropic Diving Cruises, Inc., Ft. Lauderdale, FL
 Oct. 9 — BRITISH VIRGIN ISLANDS — 12 days, Trimaran Misty Law, Hollywood, FL
 Oct. 9 — AQABA, JORDAN — 17 days, Rich Bergero, See & Sea Travel, San Francisco, CA
 Oct. 10—SAN SALVADOR ISLAND, BAHAMAS—World Wide Divers Inc., New York, NY
 Oct. 10—SAN ANDRES—8 days, Go Diving, Inc., Minneapolis, MN
 Oct. 12-28 — AUSTRALIA/CORAL SEA — 17 days, Ron Merker, See & Sea, San Francisco, CA
 Oct. 15—BIMINI—7 days, Capt. Ed Deckard, Islanders' Cruises, Miami, FL
 Oct. 16—CARTAGENA, COLOMBIA—8 days, World Wide Divers Inc., New York, NY
 Oct. 16 — GRAND CAYMAN — 8 days, Horizons Int'l, Seattle, WA
 Oct. 16 — CAYMAN ISLANDS — 8 days, See & Sea Travel, San Francisco, CA
 Oct. 16—ROATAN—8 days, Go Diving, Inc., Minneapolis, MN
 Oct. 17—BIMINI—5 days, Capt. Tom Guarino, Dive Boat Annie-Up, Key Largo, FL
 Oct. 20 — FLORIDA CAVES — 5 days, Berry Distributors, Inc., Alsip, IL
 Oct. 21 — KONA, HAWAII — 5 days, Horizons Int'l, Seattle, WA
 Oct. 23, 30—MAYA BEACH BELIZE—8 days, Horizons Int'l, Seattle, WA
 Oct. 23—COZUMEL—8 days, Go Diving, Inc., Minneapolis, MN
 Oct. 23 — COZUMEL — 8 days, See & Sea Travel, San Francisco, CA
 Oct. 23 — BONAIRE — 8 days, See & Sea, San Francisco, CA
 Oct. 23 — BRITISH VIRGIN ISLANDS — 12 days, Trimaran Misty Law, St. Thomas, VI
 Oct. 23 — CARTAGENA, COLOMBIA — 8 days, Sunland Int'l Tours, Beverly Hills, CA
 Oct. 25—BIMINI—7 days, Capt. Ed Deckard, Islanders' Cruises, Miami, FL
 Oct. 26 — AUSTRALIA/CORAL SEA — 17 days, Carl Roessler, See & Sea Travel, San Francisco, CA
 Oct. 29—HERON ISLAND—14 days, Bay Travel, Corona del Mar, CA
 Oct. 30—FREEPORT—8 days, Go Diving, Inc., Minneapolis, MN
 Oct. 31 — ARUBA — 8 days, Happy Wanderer Travel, Scarsdale, NY
 Nov. 5, 12, 19, 26 — BONAIRE — 8 days, Lisind Int'l, New York, NY
 Nov. 1, 6—BIMINI—5 days, Capt. Tom Guarino, Dive Boat Annie-Up, Key Largo, FL
 Nov. 5, 12, 19, 26 — HAITI — 5 or 8 days, Oceaneers Dive Tours Inc., Hollywood, FL
 Nov. 6, 13, 20, 27—MAYA BEACH BELIZE—8 days, Horizons Int'l, Seattle, WA
 Nov. 6 — CAYMAN ISLANDS — 8 days, See & Sea, San Francisco, CA
 Nov. 6 — FLORIDA KEYS — 7 days, Berry Distributors, Inc., Alsip, IL
 Nov. 7, 23—BAHAMAS—7 days, Tropic Diving Cruises, Inc., Ft. Lauderdale, FL
 Nov. 7—SAN SALVADOR ISLAND, BAHAMAS—World Wide Divers Inc., New York, NY

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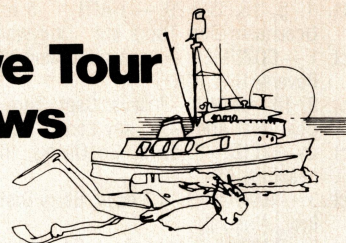
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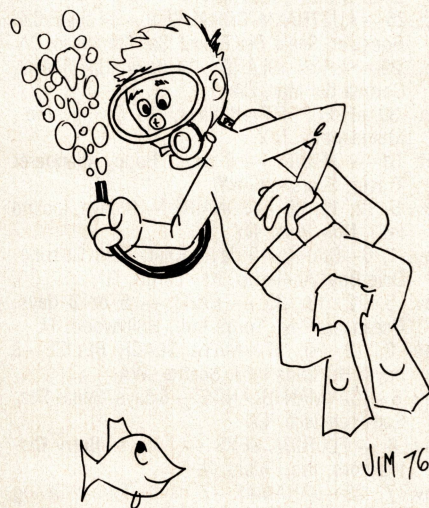
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Dive Tour News



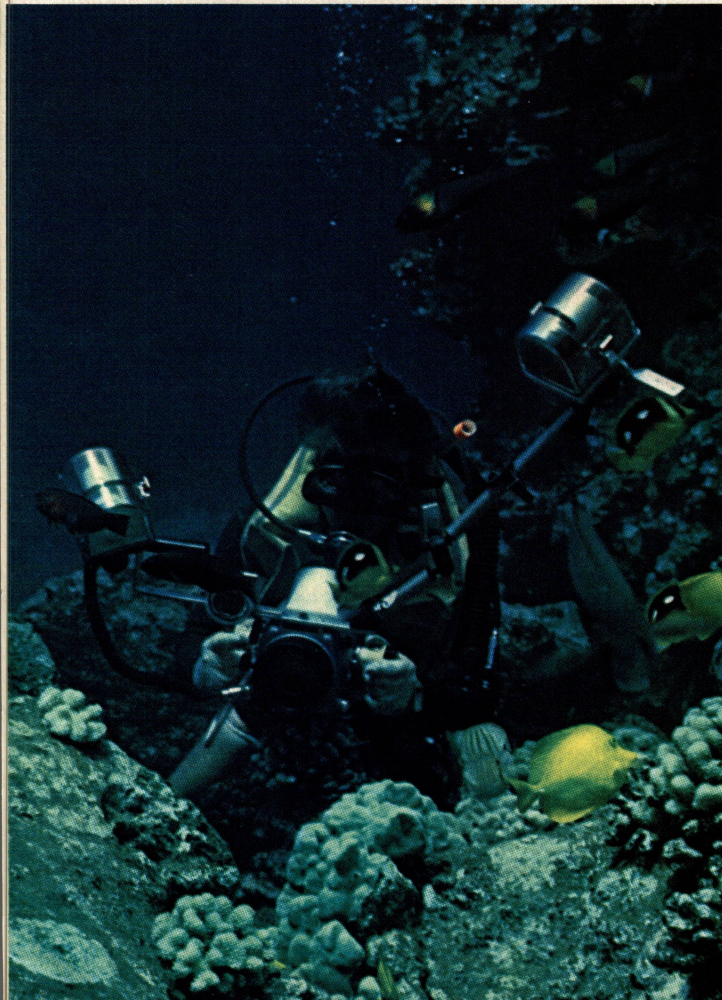
- Nov. 7—BELIZE—7 days, Go Diving, Inc., Minneapolis, MN
- Nov. 12 — BELIZE — 7 days, NASDS store/school, Denver, CO
- Nov. 12, 19, 26 — BONAIRE — 8 days, Lisind Int'l, New York, NY
- Nov. 12 — BONAIRE — 8 days, Happy Wanderer, Bronxville, NY
- Nov. 12 — COZUMEL — 8 days, Sunland Int'l Tours, Beverly Hills, CA
- Nov. 14—SAN ANDRES—8 days, Go Diving, Inc., Minneapolis, MN
- Nov. 18 — KONA, HAWAII — 5 days, Horizons Int'l, Seattle, WA
- Nov. 19 — BELIZE — 7 days, NASDS store/school, Phoenix, AZ
- Nov. 20—ROATAN—8 days, Go Diving, Inc., Minneapolis, MN
- Nov. 20 — COZUMEL — 8 days, See & Sea Travel, San Francisco, CA
- Nov. 20 — CAYMAN ISLANDS — 8 days, See & Sea Travel, San Francisco, CA
- Nov. 27 — GRAND CAYMAN — 8 days, Jack's Dive Center Inc., Plainville, CT
- Nov. 27—COZUMEL—8 days, Go Diving, Inc., Minneapolis, MN
- Nov. 27 — SEA OF CORTEZ — 9 days, Sunland Int'l Tours, Beverly Hills, CA
- Dec. 3, 12, 27—BAHAMAS—7 days, Tropic Diving Cruises, Inc., Ft. Lauderdale, FL
- Dec. 3 — BONAIRE — 8 days, Happy Wanderer Travel, Scarsdale, NY



Dec. 3, 10, 17, 24, 30 — BONAIRE — 8 days, Lisind Int'l, New York, NY
 Dec. 3, 10, 17 — HAITI — 5 or 8 days, Oceaneers Dive Tours Inc., Hollywood, FL
 Dec. 4, 11, 18, 25 — MAYA BEACH BELIZE — 8 days, Horizons Int'l, Seattle, WA
 Dec. 4 — BELIZE — 7 days, NASDS store/school, Huntsville, AL
 Dec. 4 — FREEPORT — 8 days, Go Diving, Inc., Minneapolis, MN
 Dec. 8 — FLORIDA CAVES — 5 days, Berry Distributors, Inc., Alsip, IL
 Dec. 12 — BELIZE — 7 days, Go Diving, Inc., Minneapolis, MN
 Dec. 14 — AUSTRALIA — 22 days, Pier 161 Scuba Center, Columbus, OH
 Dec. 18 — CAYMAN ISLANDS — 10 days, See & Sea Travel, San Francisco, CA
 Dec. 18 — COZUMEL — 10 days, See & Sea Travel, San Francisco, CA
 Dec. 19 — SAN ANDRES — 8 days, Go Diving, Inc., Minneapolis, MN
 Dec. 19 — ROATAN — 8 days, Go Diving, Inc., Minneapolis, MN
 Dec. 19 — COZUMEL — 8 days, Go Diving, Inc., Minneapolis, MN
 Dec. 19 — FREEPORT — 8 days, Go Diving, Inc., Minneapolis, MN
 Dec. 19 — BELIZE — 7 days, Go Diving, Inc., Minneapolis, MN
 Dec. 23 — KONA — 7 days, See & Sea Travel, San Francisco, CA
 Dec. 24 — SAN SALVADOR — 8 days, Horikzons Int'l, Seattle, WA
 Dec. 24 — BONAIRE — 8 days, Happy Wanderer Travel, Scarsdale, NY
 Dec. 24 — HAITI — 8 days, Happy Wanderer Travel, Scarsdale, NY
 Dec. 24 — HAITI — 10 days, Oceaneers, Hollywood, FL

Dec. 26 — SAN ANDRES — 8 days, Go Diving, Inc., Minneapolis, MN
 Dec. 26 — ROATAN — 8 days, Go Diving, Inc., Minneapolis, MN
 Dec. 26 — COZUMEL — 8 days, Go Diving, Inc., Minneapolis, MN
 Dec. 26 — FREEPORT — 8 days, Go Diving, Inc., Minneapolis, MN
 Dec. 26 — BELIZE — 7 days, Go Diving, Inc., Minneapolis, MN
 Dec. 27 — COZUMEL — 8 days, Sunland Int'l Tours, Beverly Hills, CA
 Dec. 30 — KONA — 7 days, See & Sea Travel, San Francisco, CA
 Jan. 1, 8, 15, 22, 29 — MAYA BEACH BELIZE — 8 days, Horizons Int'l, Seattle, WA
 Jan. 15 — CAYMAN ISLANDS — 8 days, See & Sea Travel, Inc., San Francisco, CA
 Jan. 22 — COZUMEL — 8 days, See & Sea Travel, Inc., San Francisco, CA
 Jan. 29 — GREAT WHITE SHARK EXPEDITION — 17 days, See & Sea Travel, San Francisco, CA
 Feb. 5, 12, 19, 26 — MAYA BEACH BELIZE — 8 days, Horizons Int'l, Seattle, WA
 Feb. 11 — BONAIRE — 8 days, Happy Wanderer Travel, Scarsdale, NY
 Feb. 12 — CAYMAN ISLANDS — 8 days, See & Sea Travel, Inc., San Francisco, CA
 Feb. 18 — SAN SALVADOR — 8 days, Happy Wanderer Travel, Scarsdale, NY
 Feb. 19 — COZUMEL — 8 days, See & Sea Travel, Inc., San Francisco, CA
 Feb. 19 — BONAIRE — 8 days, See & Sea Travel, Inc., San Francisco, CA
 Mar. 5, 12, 19, 26 — MAYA BEACH BELIZE — 8 days, Horizons Int'l, Seattle, WA
 Mar. 9 — GALAPAGOS ISLANDS — 18 days, Jack McKenney, See & Sea, San Francisco, CA
 Mar. 12 — CAYMAN ISLANDS — 8 days, See & Sea Travel, Inc., San Francisco, CA

Mar. 19 — COZUMEL — 8 days, See & Sea Travel, Inc., San Francisco, CA
 Apr. 2, 9, 16, 23, 30 — MAYA BEACH BELIZE — 8 days, Horizons Int'l, Seattle, WA
 Apr. 2 — CAYMAN ISLANDS — 8 days, See & Sea Travel, Inc., San Francisco, CA
 Apr. 9 — COZUMEL — 8 days, See & Sea Travel, Inc., San Francisco, CA
 Apr. 16 — BONAIRE — 8 days, See & Sea Travel, Inc., San Francisco, CA
 Apr. 30 — REMOTE ISLAND, TAHITI — 15 days, Peter Capen, See & Sea, San Francisco, CA
 May 4 — GALAPAGOS ISLANDS — 18 days, Bob Hollis, See & Sea Travel, Inc., San Francisco, CA
 May 14 — CAYMAN ISLANDS — 8 days, See & Sea Travel, Inc., San Francisco, CA
 May 14 — RED SEA, AQABA — 15 days, Carl Roesler, See & Sea Travel, Inc., San Francisco, CA
 May 21 — COZUMEL — 8 days, See & Sea Travel, Inc., San Francisco, CA
 May 21 — BONAIRE — 8 days, See & Sea Travel, Inc., San Francisco, CA
 June 4 — REMOTE ISLANDS, TAHITI — 15 days, See & Sea Travel, Inc., San Francisco, CA
 June 4 — TRUK, MICRONESIA — 13 days, See & Sea Travel, Inc., San Francisco, CA
 June 11 — CAYMAN ISLANDS — 8 days, See & Sea Travel, Inc., San Francisco, CA
 June 18 — COZUMEL — 8 days, See & Sea Travel, Inc., San Francisco, CA
 July 2 — TRUK, MICRONESIA — 13 days, See & Sea Travel, Inc., San Francisco, CA
 July 2 — CAYMAN ISLANDS — 8 days, See & Sea Travel, Inc., San Francisco, CA
 July 6 — GALAPAGOS ISLANDS — 18 days, Paul Humann, See & Sea, San Francisco, CA
 July 9 — BONAIRE — 8 days, See & Sea Travel, Inc., San Francisco, CA
 July 16 — COZUMEL — 8 days, See & Sea Travel, Inc., San Francisco, CA



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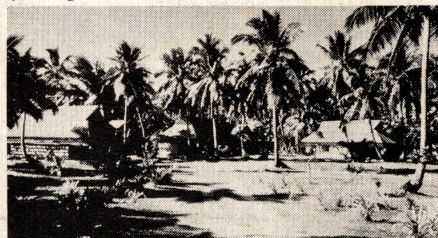
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Charter Boat Moves to Belize

Tropic, a 73 foot luxury yacht plying the waters of the Bahamas for the past five years, is being readied to begin dive operations in the waters of the great barrier reef of Belize.

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Additionally, the vessel has a 12 foot inflatable, a small sailboat, and a 13 foot power boat for leisure time activities and hard to reach places. A specially designed ramp makes exits and entries absolutely effortless in any reasonable seas.

Test cruises of the vessel and its equipment are already underway and charters are being accepted from mid November onward. Rates, information, and brochures are available through Blue Hole, Inc., 4817 W. Farmington Road, Peoria, IL 61604. Phone (309) 676-1852.

Applications for professional crew and divemaster are being accepted. Resume and salary requirements should be sent to M/Y *Tropic*, P.O. Box 895, Peoria, IL.



Spanish Bay Reef Has New Owners

Spanish Bay Reef Resort, Grand Cayman, has recently been purchased by its manager, Lach MacTavish, a native of Montreal, Canada and a partner from Alabama, Celine Givens.

One of the small dive resorts in the Caribbean, Spanish Bay Reef caters almost exclusively to scuba divers. It

boasts a friendly staff, delicious food, total dive facilities and an atmosphere of camaraderie among its guests.

Both avid divers, Lach and Celine stress that quality diving is available at SBR including a wall dive and a shallow dive each day from the resort's two 34 foot dive boats. The dive program is headed and supervised by Chuck Hepp, NAUI # 0165, who knows diving and Cayman reefs well.

Spanish Bay Reef's location on the

northwest corner of the island affords easy accessibility to both the North Sound Reef wall as well as the more popular spots on the western shore. In addition, one of Grand Cayman's mid depth reefs is just over one hundred yards off the resort.

Prices include accommodations, all meals, two boat dives per day and unlimited offshore diving. For more information, write: Spanish Bay Reef Resort, P.O. Box 800, Grand Cayman Island, British West Indies. 🌴

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Diving on one of Cap'n Mike's tours off the island of Maui is a diver's delight. They specialize in small tours of up to six people. In September, there will be a new boat added that will accommodate 13 people.

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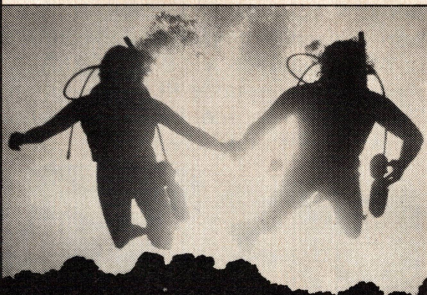
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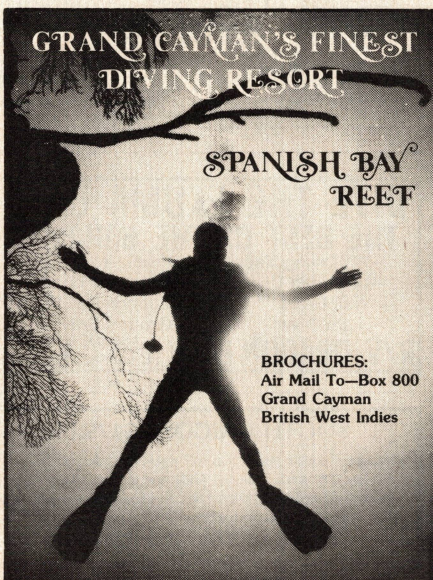
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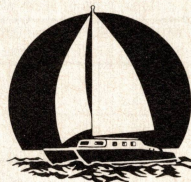
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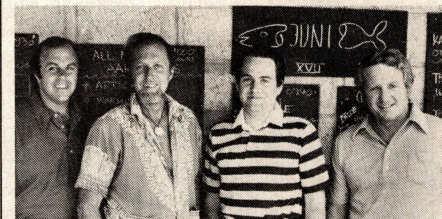
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ISI Joins Aquaventure

John E. Thomas, President of International Subaquatic Industries, Inc., and Captain Don Stewart, Managing Director of Aquaventure N.V., Bonaire N.A. are pleased to announce that International Subaquatic has acquired a substantial stock interest in Aquaventure.



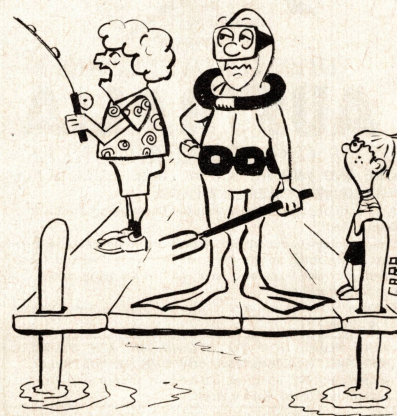
From left to right: Peter Van Leight, Don Stewart, William Morris and John Thomas.

International Subaquatic, through its wholly owned subsidiary, World Wide Divers, Inc., is involved in the retail sales of sports diving equipment, scuba instruction and scuba travel throughout the world. Aquaventure is one of the largest and most popular sports diving complexes in the Caribbean.

Mr. Thomas stated, "We are extremely pleased to join forces with Aquaventure because it has become a model for how a diving facility can and should be run. Bonaire has been rated as one of the top three diving resorts in the world by several leading dive publications. In my opinion, Bonaire is the Aspen of the diving industry. Because of the far sighted laws passed by the Bonairean Government concerning the conservation of the reefs, the natural beauty of the undersea environment will be insured for many years to come."

According to Mr. Thomas, the investment in Aquaventure is the first step in International Subaquatic's plans to fulfill the divers total needs from basic instruction to the ultimate dive complex.

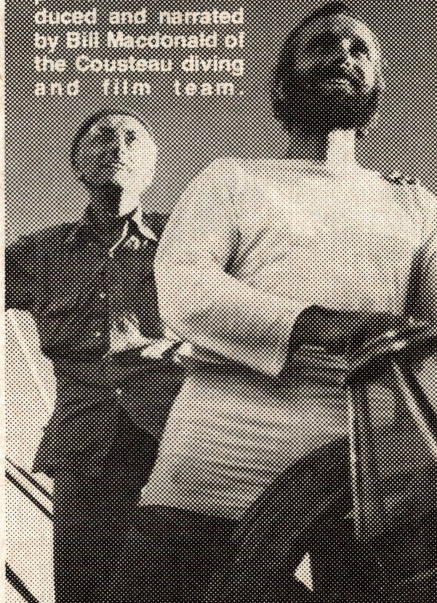
For further information please contact: Nancy Van Leight, World Wide Divers, 155 East 55th Street, New York City. (212) 688-2510.



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Underwater '76

The 22nd Underwater Film Review will be screened at 8:00 p.m. on Saturday, September 18, 1976 at John Hancock Hall on Berkeley Street, Boston, Mass. Featured film maker will be Dr. Lee Tepley. Master of ceremonies Fred Calhoun will present An Evening With Lee Tepley as well as screening his own latest film *Descent*, a study in narcosis.



Lee Tepley has been senior staff scientist in charge of Ocean Systems for Lockheed Missiles and Space Company, prior to that he was with the Palo Alto Research Laboratory where he developed systems for undersea motion picture and time lapse cinematography. Lee has been an U/W film maker since 1962. His series of underseas films has won 18 gold medals in international competition.

Dr. Tepley will personally present and narrate *Devil Fish of Canton Island* (the first extensive motion pictures of giant manta rays), *Medusa* (an inner-space odyssey featuring the giant pulsating Medusae), *The Octopus In Love And War* (documentary film on octopus behavior — mating, fighting, etc.), *Fire Under The Sea* (documentary film of the first expeditions to view and record active lava flows under water), *The Poisoned Sea* (documentary expose of the effects of pollution on offshore marine life), *Sea Lions of the Farallons* (featuring an undersea attack by Stellar sea lions), *La Mer*, and other films.

Tickets for the Underwater Film Review, Fall Edition are available at the door on the evening of the performance, or in advance by writing to Fred Calhoun, P.O. Box 291, Back Bay Annex, Boston, Mass. at \$4.00 each — make checks payable to NAUI.

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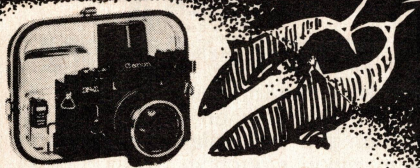
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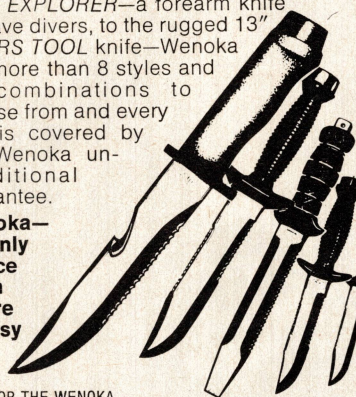
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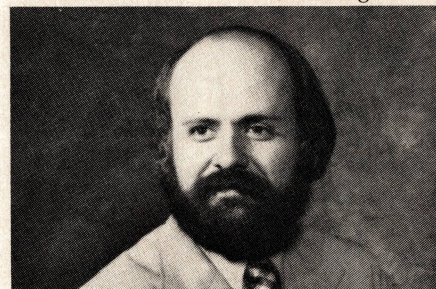
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New NAUI Branch Manager

The National Association of Underwater Instructors is pleased to announce the appointment of George Buetow as the new Mid America branch manager.



George will represent and supervise NAUI activities and instructors in the states of North Dakota, South Dakota, Nebraska, Kansas, Minnesota, Iowa, Missouri, Wisconsin, Illinois, Indiana and Michigan.

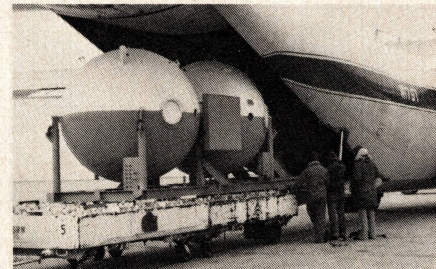
Since his certification as a NAUI instructor, George has been extremely active within the mid America branch. He has served as course director for numerous assistant instructor courses, instructor crossovers and workshops. George will also be the course director for the August 1976 Instructor Training Course to be held in Chicago.

George has actively taught all levels of scuba through Sea Sun Sports in Berwyn, Illinois, for the past four years. He is currently employed by the Cook County School District.

NAUI urges all divers in the Mid America branch to work with George to develop the diving resources of the branch.

IUC in Pakistan

International Underwater Contractors (IUC) has contracted with the Pakistan Tarbella Consortium to provide diving services on Tarbella Dam, nearing completion in Rawalpindi, West Pakistan.

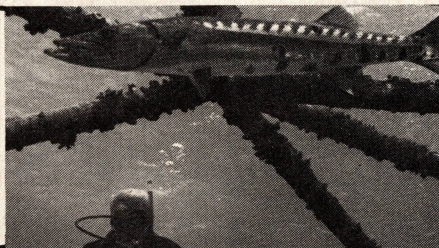


One of IUC's ambient pressure diving bells, a double lock chamber, a high pressure oil free compressor, a tri-gas mixmaker, bottles of helium, air and oxygen, a hot water heater, and other necessary equipment were transported to Rawalpindi via a Hercules air transport.

IUC's five man crew will provide back-to-back dives using IUC's proprietary tri-mix diving procedures and decompression tables. Inspection dives of the various intake structures have already been made to as deep as 320 ft. The

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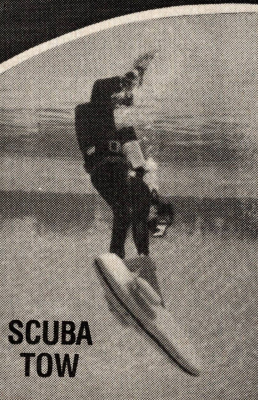
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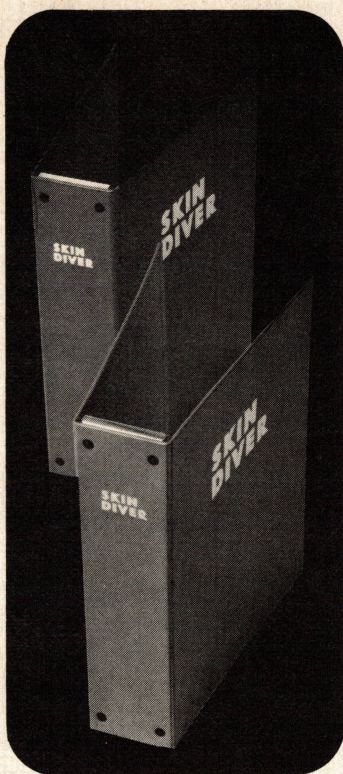
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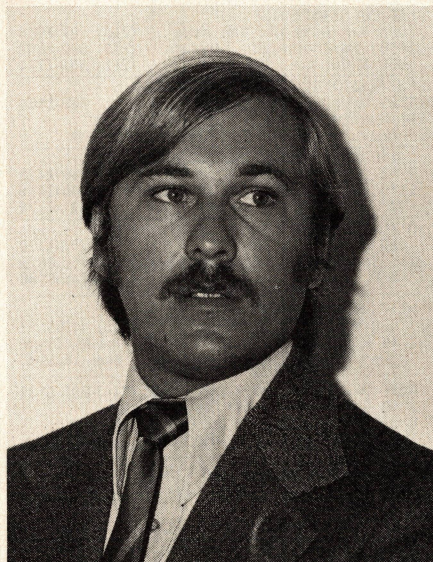
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services remaining to be provided include the removal of the intake stoplog at a depth of 230 ft., and possibly further deep inspection dives. >

Lucas Sportsways' S.E. Sales Rep.

Sportsways announced Jim Lucas as the new southeast area sales representative for Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee.



Jim has been in charge of the diving operation at Pennekamp Coral Reef Park, in the Florida Keys, for a long time and is familiar with all aspects of diving, sales, repair, etc. and also with Sportsways products. His address is P.O. Box 995, Travernier, Florida 33070. >

DIT's Tuition

John Manlove, President of the Divers Institute of Technology, Inc., has announced tuition fees for their Commercial Deep Sea Diving Courses will be increased by approximately ten per cent. The increases are scheduled to become effective with their September class which convenes on September 13, 1976.

DIT's 14 week course which covers training in such subjects as underwater physics and physiology, decompression and treatment tables, medical aspects of diving, diving equipment, deep sea diving techniques and procedures, underwater work, underwater cutting and welding, salvage, scuba, mixed gas diving, underwater demolition, offshore oil industry, etc., will be increased from \$1925 to \$2175. DIT's six month course, which contains an additional eleven weeks of advanced training in such subjects as underwater TV and sound devices, saturation theory and techniques, underwater photography, scuba instructor certification, etc., now costs \$3200.

For further details write to Divers Institute of Technology, Inc., P.O. Box 70312, 1133 N.W. 45th Street, Seattle, Washington 98107. >

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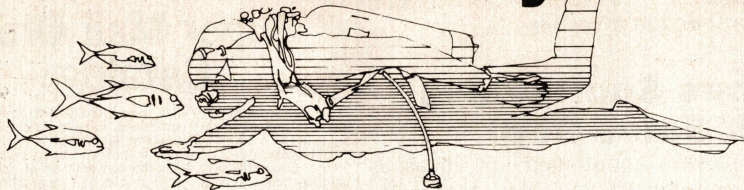
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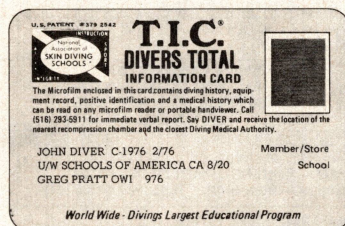
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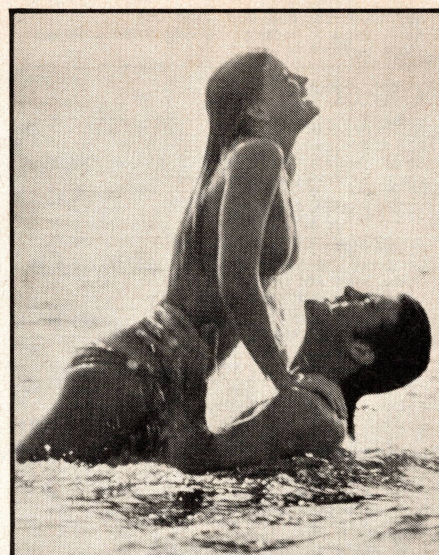
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number. The microfilm information can easily be read on any microfilm viewer. All hospitals as well as emergency personnel and police rescue units have microfilm readers available.

This new concept has met with the full approval of diving medical authorities, as well as government agencies and dive advisors to the industry.

Another area of help to the diver is the equipment record. A list of serial numbers provides immediate identification and helps to speed recovery of stolen or misplaced articles. NASDS provides a hot list to their training schools throughout the U.S. as a service to the T.I.C. card holder. These missing equipment lists are displayed at air filling stations to help you in recovering your property.

The Total Information Card is available to all divers who are now completing or who have completed a scuba course under an NSTC recognized program of instruction. In addition, non diving members of the family can also obtain this medical information service. Their card will be marked non diver and will list name and address in place of certification data.

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The National Association of Skin Diving Schools, with its worldwide membership of professional instructors, diving dealers, and training schools, is donating a portion of the proceeds of the T.I.C. Program to a non-profit fund to develop preventative measures for dive related diseases, and has asked that DEMA (Diving Equipment Manufacturers Association) match these funds in the interest of dive safety and the future development of the sport of diving.

Order forms for both the T.I.C. and the Diver's Neckpiece may be obtained at any member NASDS school, or by sending for the order form and enclosing a photocopy of your certification card to: NASDS Headquarters, P.O. Box 7666, Long Beach, CA 90806.



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Scuba U.S.A.

(Continued from Page 45)



cial dealers who carry air. It's best to fill up your tanks before leaving home. If, however, you do get into a bind for air you might check with rescue squads or fire departments in the area. Some of the emergency units are capable of filling scuba tanks and they'll usually fill your tanks for a dollar or two.

There are several dive shops in the metropolitan areas including: the Ski & Dive Shop, 1545 N. Quaker Ln., Alexandria, Va., which is just outside of Washington, D.C. Also in that vicinity is the American Water Sports of Virginia store, 2914 Annandale Rd., Falls Church, Va. In the Norfolk, Va. area is the Aqua-Lung Diving Center, 805 W. Little Creek Rd., Norfolk, Va. The dive shop located nearest the Shenandoah Valley is W & W Dive Shop, 7403 West Broad St., Richmond. Shop owner Bob White is very knowledgeable of diving in Virginia, especially in the areas near Richmond to those along the coast. Bob can also direct you to several good dive spots between the state's capital and the interior of the Valley.

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Coastal Diving Academy trains sport and commercial divers at their facility located at 106 West Main Street, Bayshore, N.Y. as well as at several open water locations. Every graduate of Coastal's 1975 professional diving class has been employed in the dive industry.

Undersea Systems, located nearby at 112 West Main Street, supplies divers, equipment and vessels for underwater inspection, construction, repair and salvage of every type.

Ribaud & Schaefer, Inc. has considerable experience in the marine and underwater markets. Among others, it is the advertising agency for ITT Decca Marine (marine electronics), Parkway Fabricators (diving suits) and Poseidon Systems U.S.A. (diving equipment). Robert Schaefer, Executive Vice President, is the account manager.

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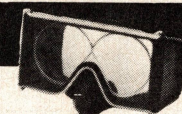
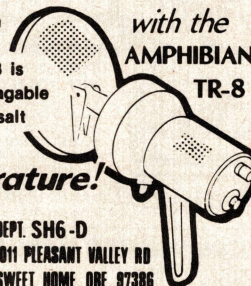
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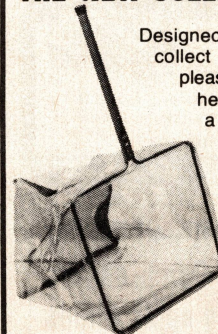
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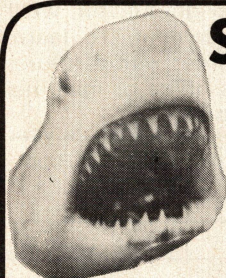
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Inner Ear Rupture

(Continued from Page 69)

or "cleared," a pressure imbalance exists, analogous to the situation seen in an external ear squeeze. This leads to swelling of the middle ear lining, blister formation and bleeding. If the pressure difference is great enough, the eardrum may rupture. The diver usually notices a mild to moderate hearing loss and possibly ringing in the ear, which improves as the swelling and blood in the middle ear disappear. The ruptured eardrum usually heals within a matter of days to weeks if an ear infection can be avoided, which means keeping water out of the ear.

Inner ear rupture results when a tear of the membrane lining either of the windows of the inner ear occurs. This allows the fluid that nourishes the organs of hearing and balance contained in the inner ear to seep into the middle ear. The amount of fluid contained in the inner ear is very minute, a small fraction of one drop. Any loss of this fluid results in a diminished hearing, possibly ringing in the ear and dizziness. The hearing loss is usually immediate, but has been noted to occur as long as three days later. This type of hearing loss is potentially much more serious than that caused by the external and middle ear squeezes because a total loss of hearing may result, which may be irreversible, and may not respond to delayed medical or surgical treatment. This is why prompt medical attention, preferably by an ear specialist, is necessary. With appropriate testing, the specialist can determine if the hearing loss is from an external or middle ear squeeze versus an inner ear rupture. Non-surgical therapy may restore, or prevent, further progression of the hearing loss. However, if it seems probable that a tear in the window membranes has occurred, surgical repair to stop the fluid leakage may be necessary to prevent any further hearing loss and may even improve what hearing has already been lost. While the exact mechanism causing the rupture is not completely understood, it almost always is seen when there is a pressure difference between the inner ear and the environment. Deep dives are not necessary to produce an inner ear rupture. It has been seen in dives from less than 12 feet. Probably sudden clearing of the ears after too great a pressure differential has been established causes violent plunging action of the stirrup, resulting in a tear of the lining membrane of the window.

Remember, any hearing loss or dizziness after a dive should be promptly brought to the attention of a medical doctor, preferably an ear specialist.



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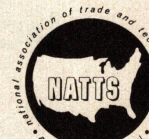
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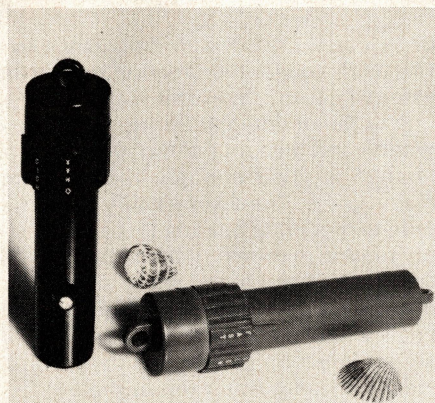
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ON UNDERWATER EDUCATION

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Sound-Wave Systems, Inc., a new manufacturer of underwater electronic equipment, has recently signed a contract with Sea-Scan, Inc. to market Sea-Scan's line of pingers and direction finders. These will be marketed under



the tradenames: Wetbeacon and Wetfinder. These units are small, inexpensive and work well inside a quarter mile range. Sound Wave Systems also manufactures a line of diver carried tape recorders with a voice activation circuit.

For further information about Sound-Wave Systems, Inc., and their products, write them at: 3001 Red Hill, Building 1, Suite 102, Costa Mesa, Calif.

Scuba Rescue Workshop

A two day Combined Cardiopulmonary Resuscitation and Scuba Rescue Workshop is tentatively scheduled for December 26-27, in the Fort Lauderdale, Florida area.

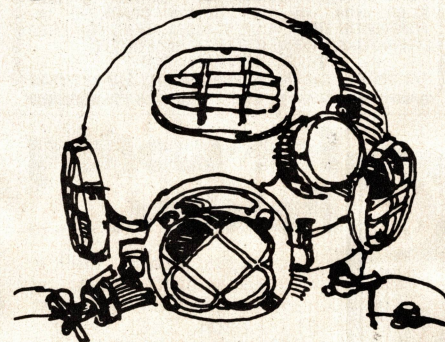
The Sunday morning session will be devoted to simulated practice on life like manikins as well as several accompanying lectures on medical aspects and physiology related to diving. A written pretest on CPR theory and basic first aid review will also be included.

The Sunday afternoon and Monday morning sessions will meet at a local beach. Planned emergency situations will include active and passive victims, as well as surface and submerged rescues. Stress will be placed upon the prevention and recognition of panic situations in the early stages. Basic first aid techniques will again be incorporated. Students will have sufficient time to put skills to use.

The Monday evening session will be devoted heavily to CPR manikin practice and rescue theory. The workshop will conclude with a final written and skills test in Cardiopulmonary Resuscitation. Students who successfully complete the program will receive American Red Cross Basic Cardiopulmonary Resuscitation Certificates.

For additional information and pre-course reading materials contact: Mr. Gerard Sterling, 2915 West 5th Street, Brooklyn, NY 11224.

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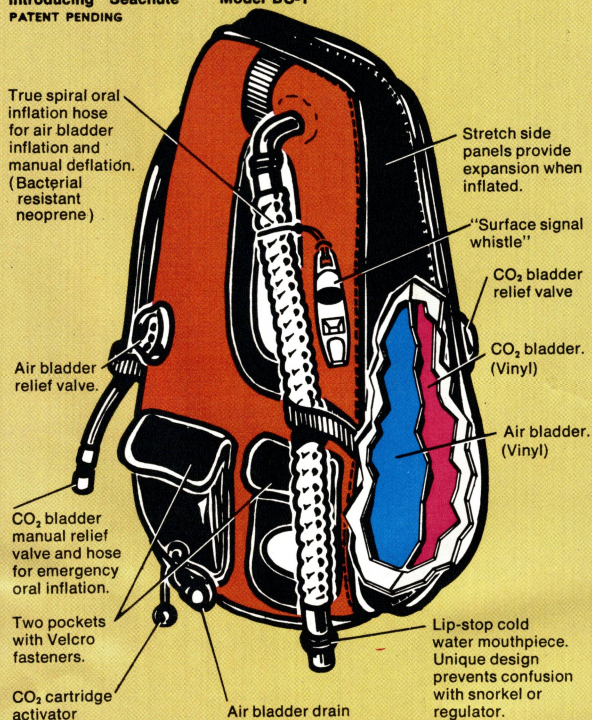
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Introducing "Seachute"™ Model BC-1
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Send \$2.00 for Dacor Diver's Kit. Includes '76 catalog, cloth patch, decomp. table, decals.

Introducing "Seachute"™ Model BC-1

Dacor's new patented Seachute System is the most advanced buoyancy control device and personal flotation vest available to the diver. Only the Seachute gives you three-way inflation 1) From the diver's air tank through the air inflation hose, 2) Orally into the air or CO₂ bladder, 3) From the 25 gram CO₂ cartridge. The dual bladder design gives the diver emergency back-up inflation if tank is empty. The complete separation of air and CO₂ bladders also prevents accidental inhalation of CO₂. No exchange of gases can take place between the two bladders. The CO₂ bladder is a completely independent component with its own over pressure relief valve, drain, and inflate-deflate hose.

Unique new stretch side panels provide: A better ratio of small size to large buoyancy capacity, less width uninflated for more comfort, less length for minimal interference with quick-re-

lease buckles, and maximum inflation without chest squeeze—side panels allow expansion outward away from body.

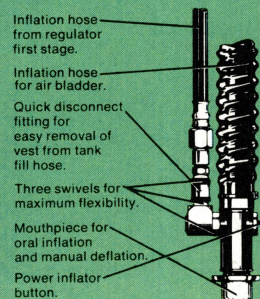
Construction of high tensile strength nylon over vinyl inner bladders. Tough ultrasonically welded seams and sewn edge binding. Exclusive "Kwik" harness with collar fastened crotch strap and shoulder straps. Eliminates waist belt. 42 lbs. buoyancy at the surface. Designed for the advanced or professional diver. Features twin pockets with Velcro fasteners, drains, and gusset sides. Oral hose has true spiral design (allows complete drainage) and lipstop cold-water mouthpiece which prevents confusion with snorkel or regulator mouthpieces.

DACOR CORPORATION

161 Northfield Road
Northfield, IL 60093
P.O. Box 157 Cable: DIVECOR



MODEL VIS Power Vest Inflator



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- D.O.T. Approved — Permit SP-6498
- Convenient flat bottom for standing — Over .467 wall thickness — greater than steel
- 100% Rust-free
- Designed to withstand a minimum of 100,000 filling cycles 0-3000 psi
- Aluminum is 100% ultrasonically tested for hidden defects

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